



PARKWAYS, GREENWAYS, RIVERWAYS

The Way More Beautiful

Proceedings of the Third Biennial
International Linear Parks Conference
1989

PARKWAYS, GREENWAYS, RIVERWAYS:
The Way More Beautiful



The Appalachian Consortium

The Appalachian Consortium is a non-profit educational organization comprised of institutions and agencies located in the Southern Highlands. Our members are volunteers who plan and execute projects which serve 156 mountain counties in seven states. Among our goals are:

- *Preserving the cultural heritage of Southern Appalachia*
- *Protecting the mountain environment*
- *Improving the educational opportunities for area students and teachers*
- *Conducting scientific, social, and economic research*
- *Promoting a positive image of Appalachia*
- *Encouraging regional cooperation*

The Member Institutions of the Appalachian Consortium are:

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 Warren Wilson College
 Western Carolina University
 Western North Carolina Historical Society

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Warren Wilson College

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The Appalachian Consortium was a non-profit educational organization composed of institutions and agencies located in Southern Appalachia. From 1973 to 2004, its members published pioneering works in Appalachian studies documenting the history and cultural heritage of the region. The Appalachian Consortium Press was the first publisher devoted solely to the region and many of the works it published remain seminal in the field to this day.

With funding from the Andrew W. Mellon Foundation and the National Endowment for the Humanities through the Humanities Open Book Program, Appalachian State University has published new paperback and open access digital editions of works from the Appalachian Consortium Press.

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Introduction

“Parkways, Greenways, Riverways: The Way More Beautiful,” took place September 19-22, 1989 at the Great Smokies Hilton Resort in Asheville, North Carolina. It represented the third in a series of biennial conferences focused on linear parks.

The first such conference was held in 1985 at Appalachian State University in Boone, North Carolina in celebration of the Blue Ridge Parkway’s Golden Anniversary. Conference presentations examined the impact of the Blue Ridge Parkway as an agent of transition in the southern Appalachian region. Widespread interest in this event led to another conference two years later. As a result of suggestions from participants in the first conference, the objective of the 1987 meeting was expanded to include parkways around the world. Titled “Parkways: Past, Present, and Future,” the second conference was held in Roanoke, Virginia. Presenters attended from thirty states, Canada, Europe, and Asia, representing a wide variety of disciplines and viewpoints.

As the title of the present proceedings suggests, the third conference reflected yet another extension of the biennial gathering’s theme. The perspective remained international, but papers discussing several types of linear parks—parkways, greenways, and riverways—were solicited. “The Way More Beautiful,” as conference chair Barry Buxton explained, represented the belief that there are viable alternatives to the onslaught of development, billboards, and commercialism that is rapidly eroding the remnants of scenic landscapes and degrading the environment.

Conference objectives, which had evolved from the 1985 and 1987 meetings, were to:

- Examine from an interdisciplinary perspective the historical, conceptual, and design foundations of linear parks around the world.
- Focus international attention on the importance of linear parks.
- Provide a biennial forum for the exchange of knowledge and experience related to linear parks.
- Foster a sense of “shared community” among practitioners from diverse cultural and professional backgrounds.
- Identify common values and mechanisms for the sustained support of linear parks.

Once again, this linear parks conference constituted a cooperative effort. The Appalachian Consortium and Blue Ridge Parkway were the two primary sponsors. Also instrumental were the River Foundation, American Society of Landscape Architects (ASLA), and North Carolina Chapter of the ASLA. Important support came from the Lyndhurst Foundation, Broyhill Family Foundation, Janirve Foundation, German Marshall Fund, and Blumenthal Family Foundation.

More than 100 presentations appeared on the program. Individual papers, grouped into concurrent tracks, allowed participants to devote particular attention to parkway development, riverway efforts, or greenway systems. Plenary sessions were intended to relate more generally to linear parks. A special part of the conference was the presentation of awards to winners of the Student Art Competition. A tribute to Earth Year, featuring author Thomas Berry, musician Eugene Friesen, and poet Thomas Rain Crowe, took place one evening and was open to the general public. The conference schedule also included multimedia presentations and optional off-site tours. Over a dozen exhibitors represented academic presses, environmental groups, regional artists, linear-parks-related businesses, film makers, landscape architects, and natural resource management agencies.

Unfortunately, the summer's dramatic occurrences in Beijing's Tianamen Square forced Li Rusheng of China's Ministry of Construction to cancel his scheduled participation. Remarks to the general session, based on Mr. Rusheng's formal paper, were presented by Ms. Jane Chang of Shanghai. The conference was also not insulated from natural events. Hurricane Hugo's high winds and heavy rains somewhat disrupted the meeting's final two days. Although the worst winds were confined to coastal areas, some participants left Asheville early to assure their flight connections. One keynote speaker barely arrived because of downed trees on nearby roads. Members of the conference steering committee decided to cancel the final plenary and closing sessions so that everyone could travel more safely.

Despite these unforeseen circumstances, the conference's overall size and international flavor both grew. Over 250 reservations were made for the first evening's banquet. The final count of attendees during the four days exceeded 300. Participants came from across the United States as well as from Japan, China, Portugal, Poland, The Netherlands, Bolivia, and Canada.

One of the prices of the great interest and enthusiasm for linear parks was the difficult decisions that had to be made concerning the contents of this publication. Over 60 people submitted papers for consideration for inclusion in the conference proceedings. For the first time in the history of these conferences, a review committee had to be formed to narrow the number of papers to be published. There was no shortage of creative approaches to the development, management, and protection of parkways, greenways, and riverways. Thus, papers that do not appear in this book were generally not rejected because of the review committee's evaluation of the quality of the presenters' work. Several other factors entered into the selection process. Papers less likely to be included were those by authors whose writing had appeared in a previous proceedings, those that depended substantially upon slides or other audiovisual material, and those with content appealing to a restricted audience.

This proceedings opens with the six keynote addresses presented in general conference sessions. The remaining 30 papers from the concurrent sessions have been divided into six broad categories: Historical Perspectives, Design and Planning, Environmental Considerations, Citizen Involvement, and Management. Listed in the Appendix are conference presentations that were not included in the proceedings.

The editor wishes to extend his appreciation to members of the review panel and to editorial assistants Thomas Rash and Mark Suggs. Mr. Rash helped review the papers for mechanics and clarity, while Mr. Suggs took charge of typesetting and production. In addition, Mike Epley, Executive Director of the Appalachian Consortium, and debbie Fields, Consortium Secretary, provided indispensable logistical support for the publication of this book. The review and editing procedures, coupled with staff changes at the Appalachian Consortium, have delayed the completion of this publication significantly. The conference presenters and participants deserve special thanks for their patience.

A fourth conference on linear parks is scheduled for Charlottesville, Virginia in the fall of 1989. We invite you to join us in this and future such conferences to share ideas and get to know the community of people from around the world involved in protecting the Way More Beautiful.

Woodward S. Bousquet
Proceedings Editor
August 1991

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I. Keynote Addresses

Building Community Support for Linear Parks

Anne Lusk, *Greenway Promotions, Stowe, Vermont*

I have no hidden agenda. What I want is to see greenways built all across America. If pushed, I will admit that I'd really be happy if they were built all across the world. These desired greenways cover the broadest definition of the word and include everything from biking or hiking trails to wildlife corridors to green linear parks to riverways.

When I received my conference program in the mail, I read it and smiled. I noticed that I had been chosen as one of the keynote speakers, probably out of tokenism. Lest you think, "Ah, she was chosen because she is a woman," that's not it. I believe that I was chosen because based on the job titles of the other keynote speakers, I'm about as grassroots as you can get. I come from a town of 3,000 in Vermont. Since 1981, I've been working for the Town of Stowe building a small-town greenway. It's a five-mile paved path that runs alongside a mountain stream and crosses the river on ten bridges. I had to raise a total of \$680,000 to build the path and talk 32 different land owners into giving their land to the town. The completed path has won a *Land and Water Conservation Fund Award*, a *Take Pride in America Finalist Award*, and a *Rudy Bruner Award for Urban Excellence*. The latter award was won not because Stowe is an urban community, but because of the tremendous community enthusiasm and because it is a model project easily duplicated by other communities.

I confess, I like working with communities so much that I read fund-raising and building-community-support books like other people eat popcorn. Not too long ago, I was going through Joan Flanagan's *The Grassroots Fundraising Book* and I read her definition of grassroots. She said, "Grassroots simply means you are ordinary people."

All of you are, for one reason or another,

extraordinary people. Just for the moment, however, I'd like to talk to the ordinary person in you. I want to talk to your human kindness, your consideration, your generosity, your enthusiasm, and your compassion. It is these simple qualities that you will use to build community support.

Linear parks are such dynamite ideas that you should be able to walk right up to the public at large and say, "Just build it! It's a good idea." But if you did that, even if you got a park built, you wouldn't be giving the public the real gift that you can give them if you build community support. When members of the public help build the linear park, they own it and they take pride in it. Every time they use it or drive by it, they say, "I built that." And that's the gift you give the public by letting them help, by building community support.

A good analogy to giving this gift to the public is to instead think of helping little old ladies across the street. If you placed little old ladies on every street corner in the morning, then people on their way to work could help a lady across the street. They would go to work feeling terrific because they had just helped someone. Creating greenways, which can be for senior citizens, children, individuals in wheelchairs, or those with less income, is just one way to be nice to people. The added bonus is that greenways help the land and wildlife too.

Not too long ago, I was talking to someone about building community support, and I said that you had to use the echo effect. He corrected me and said, "Anne, that's the ripple effect." I said, "Nope." With the ripple effect, you set the waves in motion, but they fade out and go away. With the echo effect, you get to hear back from the public. They send you money to build

the path, or, after it's built, they call you up to say "Hey, the path's terrific." So though you have given a gift to your community in seeking their help and in building community enthusiasm, keep in mind the echo effect. The public thanks you back.

The task of building community support is really relatively easy. A while back, I was at a speech given by a freshman legislator from Vermont. He said that getting legislation passed in Washington was like turning the Queen Mary in a bathtub. Building community support for a linear park is much easier. People want to do something good for the environment; the path can be handicapped accessible, and it benefits all ages and all incomes. Building community support for greenways can be done. If anything, it's really more like turning the Queen Mary in a Jacuzzi.

In answer to what building community support is really like, I'd say it's similar to a good program on public television. A good program on public television is half education and half entertainment. If you go out to the public to talk about greenways and you try to educate them with intimidating statistics, involved case studies, and frightening projections—if you hit them with too much logic, they balk at the intensity.

If, on the other extreme, you just give them fluff, they will think it is a fly-by-night idea of no substance. Building community support is half education and half entertainment.

Now, how do you go about building this community support? Identify your public. Is it a small town or a whole state? Once you've identified your public, think of how you would talk to that public. The trick is to think of this as a personal conversation. Of course, you won't be able to talk personally to everyone, but they can be reached through newspapers, magazines, radio, television, and public speaking. Now don't be a media snob and decide you will

only talk through the highbrow publications. Good people read the little papers, too.

I confess that I was a media snob on a nationwide level. I work on promoting the creation of greenways nationwide, and one day in Washington I was talking to Emily de Roco from the Take Pride in America office. I explained that I didn't know how to go about getting greenways in *Time*, *Newsweek*, or even *The New York Times*. Emily said, "Stop aiming for those publications. Go after *Reader's Digest*. The people who read *Reader's Digest* are doers, and they will build greenways.

After you identify your public and know who you are going to talk to, then look at your own sincerity. Do you really believe this parkway, greenway, or riverway is a good idea? If you are wavering, get someone else to sell the concept. The public is perceptive and will not commit if you are not committed. You can be young, old, rich, poor, "a good ole boy," or an ingenue. It's your enthusiasm that is evident, and it can be infectious.

Maybe some people are born with the self-confidence to build community support, but to others it's easy to look at someone successful at it and say, "They can do it and I can't." Shortly after getting my Master of Arts in Teaching with a specialization in historic preservation, I went to an historic preservation conference. There were some well-to-do women who were the organizers. Later I learned that they had ample time and resources to do the work because their children had graduated from college, their husbands were retired, and they were comfortably set in life. In another instance I began working with some established businessmen and realized that they had the ability to call on a variety of close business associates for help. Somewhat later I worked with some locals on a project and realized that they had an extensive family network plus a heritage that went generations back.

They had credibility, which, as a relative newcomer, I was sorely lacking. But in Stowe, there was discussion about tearing down the 1860 Greek Revival Old Stowe High School and putting up a new smaller library. I hesitated to jump in based on all of the aforementioned reservations, but I just didn't want to see the building torn down. It is now the \$500,000 restored Town Library and Art Center and is one of the 124 Stowe Village buildings that were listed on the National Register of Historic Places.

Once established with your base—by identifying your public and your convictions, and by looking at your sincerity—the specific steps involve the following 15 points. These 15 points might be an oversimplification of building community support, but without community support you will have nothing but a stack of feasibility studies, and we've all seen stacks of feasibility studies. I want you all to feel as if building community support is easy, a shoo-in, so that you won't hesitate to do it . . . and we'll have greenways and linear parks built not only nationwide but all around the world.

1. Get before the public by creating the news either by a.) important meetings or timely decisions, or b.) clever events.

I'll admit that sometimes I'll hold specific meetings or make important decisions based on how and when they will hit the press. Of course, I try to anticipate the outcome of the meeting so I don't have any unwanted surprises, and I check with many other groups so they too aren't surprised, but much of the press exposure is positioning for front page. Politicians do this, so why shouldn't linear park builders do it?

On the clever events, I never fret about whether or not they will be well attended. I know that the publicity before the event and after the event is a better payoff than the

event itself. If I hold an event and hope to have 200 people attend, I don't get discouraged if only 175 people attend. Those 175 people are having a good time, and all of the advance and follow-up publicity may have been read by someone who wasn't planning to attend but who was intending to send in a donation. Having read about the amount of effort that went into the event and realizing the amount of fun the participants had, that donor will probably write a larger check.

2. Involve every sector of the community, and be public about the participation.

Sometimes, only the people of wealth are allowed to participate in fund-raising activities. You get the largest contribution from them with the least labor. But that leaves out the little guy who might be giving a proportionate or even greater percentage of his income. Find ways to include him.

In Stowe for the Stowe Recreation Path, donations were sought by "selling" pieces of the path. You could buy one inch for as little as two dollars, a foot for \$15, a yard for \$45. I have people who bought a foot and had never given to a nonprofit organization before in their lives, but the path is now theirs and they feel the pride. The donor sign at the beginning of the path lists the names of all the donors, large and small, and it even lists the tourists who gave. I've said that for a tourist the sign has more of a draw than the Trevi Fountain. If you throw three coins in the Trevi Fountain, you will see Italy again. If you sent in a contribution to the Stowe Recreation Path, you'll return to find your name on the sign.

3. Spread the credit to others.

You can have no ego in building community support. Your achievements are measured

in community consensus, in giving credit to others. This is the hardest part for those people who realize it's more efficient to be a one-person decision maker.

One of the walkways publications stated that to be a good leader for creating walkways, you should be equally passive and aggressive. In the community you have to be passive so the people feel their ideas are heard, and you have to be aggressive so they know if they give you their ideas, you will get the job done. In your job as go-between, facilitator, or mediator, remember it's not the little victories scored along the way that count, it's whether or not you got the job done in the end. That's how people will measure your worth, so spread the credit to others. People will know in the end it was your shuttle diplomacy that got the job done.

4. If possible, write your own newspaper or magazine articles.

A good newspaper reporter will be especially nonpartisan and try hard to tell both sides of the story. These parkways and greenways are so universally beneficial, however, that there really isn't a dark side, and you can say that honestly.

If you don't feel qualified to write, then find a sympathetic writer. And just as you were going to get people involved and spread the credit to them, make sure the writer realizes the significance of his or her involvement. A path can be created or not get off the drawing board based on the persuasiveness of the stories told by the writer.

5. Pictures, Pictures, Pictures.

We all know a picture is worth a thousand words. If given my druthers, I'll always take a really good picture with a small caption under it rather than a tiresome departmental news release, which always gets relegated

to the back of the newspaper.

You've got a golden opportunity with greenways, riverways, and parkways. They are all lovely chances for pictures. And don't just line up five heads of the department and have a blow-up of the check and pass it from one person to the other. Get all of those department heads out there with some bicycles or in running shoes. If they insist on the dignity of a business suit, get them surrounded by kids on bikes or tricycles. Have fun with your pictures and get some nice candid shots. Show the joy in linear parks. There's so much of it, it's not hard to capture.

6. Write at a sixth-grade level.

This is not insulting to your audience; rather, in a way, it is flattering to your readers. You are acknowledging that their lives are extremely busy and that if they do find the time to read the material, they are apt to scan it. Just write it plainly yet appealingly enough so that when they do scan it they scan the whole article.

7. Always stress the merits.

You won't struggle with this point. You won't even sound like a forced Pollyanna. It's easy to say good things about linear parks. Just to guard against an article of yours sounding like a puff piece, remember that balance between half education and half entertainment? Include some of that education and put in some hard facts to bring the vision of the greenway back to earth and down to reality.

8. Be visible as often as possible, and be receptive.

In the small town of Stowe, I hang out at the gas station, and I hold informal business meetings in the aisles of the grocery store.

People I've never met before call me up on the phone at night to give me ideas. I've gotten a lot of good ideas that way.

9. Think big.

If the idea seems too wild, think of the Summer Olympics in California and all of those grand pianos. And don't just aim for public awareness, aim for action. Aim to get the greenways built because if you aim for path creation, along the way people will automatically become aware.

10. At events, make sure everyone is having a good time.

Even during construction of the walkway, make sure everyone feels included.

I have a reputation around Stowe for having ruined some backhoe and bulldozer operators. I get out in the field with them and say, "Okay guys. This is what we want. We want the path to meander, to go up and down, to widen and narrow, to open up views and duck back into the shade, to catch the sound of the brook and then head to the quiet of the woods." These guys understand what I'm saying, and they really get into it. Then they are ruined. They never want to go back to digging cellar holes or sewer lines.

11. Repetition, repetition, repetition: nothing drives the home better.

I once told someone that if you get an invitation to a community event and you read about it on one little Xeroxed note sent out by bulk mail, you probably won't want to go to the event. But if you get an engraved invitation, hand-addressed with a pretty twenty-nine-cent stamp on it, you read six different articles in the paper about the event, and you see posters and banners all over town, you are going to want to go to that

event. The message was the same every time in the invitation, the articles, and the posters, but the repetition made your sense of anticipation greater. You really wanted to go to the event.

12. Plan on doing pre-publicity, publicity, and post-publicity.

The post is if you want to do something similar again. Members of the public will look at your track record, whether or not you acknowledged them, and they will respond to your new idea accordingly.

13. Simplify and clarify.

Think, defend, and explain in simple sentences. I know this is especially tough for some of you, but it is the best way to talk to the community.

14. Be consistent.

Your perseverance, though not always acknowledged, is watched by the public. And watch your allegiances, too. If you take on five polarized causes, the public will wonder about your convictions and your attention span.

15. Last, say thank you.

Maybe if you are 102 years old and you never plan to need community support ever again, you can risk not saying thank you. Better chances are that you are someday going to want to do something again with your community. Community members will remember if you said thank you the first time.

Thank you's can be handled on a case-by-case basis and include general letters to the newspaper editor, formal business letters, mention on the radio, phone calls, personally baked and delivered chocolate chip cookies,

and of course, personal notes. The notes needn't just start out with the typical "Thank you so much for . . ." get into the heart of the project and tell the person exactly what their contribution did and how much it meant.

There exist so many good feasibility studies gathering dust in file cabinets because no one went out in search of public

involvement. The public is receptive to a good idea. Parkways, greenways, and riverways are good ideas. Remember, *The Report of the President's Commission on Americans Outdoors* called for a prairie fire of local concern to champion the cause. By building community support, you can make that prairie fire roar.

The Invincible Consensus: Opportunities for Cooperative Approaches to Protection of Linear Parks

Jerry L. Rogers, Associate Director for Cultural Resources, National Park Service, Washington, D.C.

Five weeks ago I was in North Dakota at the Fort Union Trading Post National Historic Site where I had the pleasure of watching traditional dances and listening to the music and the folk tales of a Standing Rock Sioux Indian. This individual has a graduate degree in Native American studies and has devoted his life to preservation of Northern Plains Indian cultural traditions. He has found performances among the best ways to achieve his objective, and so he shares his knowledge frequently. He explained the Northern Plains Indians comprehension of the universe as a circle. It is tempting to speculate about the origins of such a view—if you stand on the Plains, no matter which way you turn, the horizon is equidistant. In other words, the visible world is a circle around you. If you apply to this the seven cardinal directions of the Northern Plains tribes—east, west, north, south, up, down, and the center, the universe becomes a globe. Not a globe such as the planet Earth, with Siberia, South America, Europe, and Australia on opposite sides, but a conceptual globe with each individual at the center. The storyteller joked about his confusion at flying across America in an airliner and looking down to see the world

divided not into circles, but into squares.

High atop the Bighorn Mountains in northeastern Wyoming is a holy place called the Medicine Wheel. It is a 150-foot diameter circle of stones with a large central cairn and 28 lines radiating like spokes from the center. This wheel is the largest of a fairly common expression of an idea related to the one the storyteller shared at Fort Union. It is used to explain the universe (and human life), with all of its apparent contradictions, in unifying terms. The west side of the Medicine Wheel is the Looks-Within Place, representing the introspective nature of humankind. The east side is the Place of Illumination, where we can see everything clearly even at great distances. The south side is the Place of Innocence and Trust, and the north side is the Place of Wisdom, where one may know that trust is not always appropriate.

In a book called *Seven Arrows*, a fellow named Storm explains that each person is born into the world at some point within the Medicine Wheel. Our starting place determines our natural predilections and our instinctive way of perceiving the world. But if we stay in that starting place, we will

remain incomplete. A person who remains only in the north will have wisdom but not feeling. One remaining in the east will have clear, far-sighted vision but will never be close to things. One remaining in the south will be the sort of lovable but gullible soul we have all known, and one remaining in the west will see only that which is within himself and thus will go over the same ideas again and again. The quest of life is to attain completeness by seeking experience at many points on and within the Medicine Wheel. In this way a person can gain the benefits of innocence and wisdom and can comprehend things on a grand scale and a small scale as well. Only when we have been around the Medicine Wheel can we attain its center and be capable of balance in the decisions we must make in life.

By now you are surely wondering if I have not gotten into the wrong symposium. This one is not supposed to be about circles or squares but about lines. I believe that these metaphors are applicable to all parks. We are and we want to be centers of the worlds within which we work, but our centers are often far off to one side or another of the Medicine Wheel. Parks, linear and otherwise, now have major effects upon the non-park world, and, clearly, the non-park world has major and often threatening effects upon us. We must learn to understand better these other forces and to make them understand us. In this respect, the most important difference between a linear park and a park with a unified land base is that the linear park brings its benefits and its problems to more places, more jurisdictions, and more people than the compact park and thus has an even more complicated Medicine Wheel to experience.

But, you say, we are the good guys trying to give nature a chance to survive, trying to preserve history for the inspiration and guidance of present and future generations, trying to make places of beauty and

solace available to harried souls of the late twentieth century. The bad guys are the ones who send the detritus of their factories into the clouds to rain upon the parks, who build ugliness on the edge of the park boundaries, who keep our budgets so small that we cannot fully execute our duties. I believe that, of course, or I could not bring to my job the zeal that makes it satisfying, but that is my spot on the Medicine Wheel. You and I need to understand the people who are at other places on the wheel. Only then can we know how best to tolerate the negative forces we cannot overcome and how best to overcome those we cannot tolerate.

My purpose in speaking to you today is to emphasize that we have not yet incorporated into our pro-park attitudes many other points of view that not only are valid but that have the potential to strengthen and enrich us. I will advocate one major step by which park managers in the United States, especially National Park Service managers, could very significantly strengthen and enrich their positions. Perhaps other nations will derive some benefit from the discussion. I know that much of what I advocate can be learned from other nations.

The idea of national parks has been broadly accepted throughout the world. Although the idea of what constitutes a national park appropriately varies greatly from one country to another, 135 nations now have national parks.

The idea of preserving history has long been accepted throughout the world. It is not unusual for a nation to elevate this duty to cabinet-level status as a ministry of antiquities or to make it part of a ministry of culture. It is also not unusual for a nation's list of protected monuments, such as our National Register, to extend beyond a selected few outstanding historic places and to encompass hundreds of thousands of places that are important only to their localities.

What is rare is to find the national park management and the cultural resource management functions in the same agency. Perhaps there are valid innate reasons behind the tendency to separate the two, for here in the United States the two have almost always been in the same federal agency, and yet we have been very slow in bringing them into a fully effective union. It is still common for people who work in the park field—national, state, or local—to presume that their jobs deal with a combination of nature, beauty, and outdoor recreation, and for cultural resources to be an afterthought, if given any thought at all. It is not true today, I am happy to say, but not many years ago one could have found a consensus among national park managers that we should be concerned with only the nationally significant areas within park boundaries and should not worry about the more numerous areas of local significance throughout the country. At the same time, it was not unusual for state and local preservationists, who generally were somewhat more urban in orientation, to discount the cultural resource work done by the National Park Service and to downplay the origins of their own programs with the Service.

For reasons far too complex for exposition here, the problem became so bad that a few years ago the National Conference of State Historic Preservation Officers adopted a policy to support creation of an independent agency within the United States government to lead the nation's historic preservation—synonymous with cultural resource management—programs. Fortunately, the state historic preservation officers are by no means united in support of such a change, and the many other facets of our historic preservation movement are generally opposed to it. I, myself, who might normally be maneuvering to become head of such an agency, am the most conspicuous and vigorous opponent. Now I believe that the

chances of such an independent agency actually being created are very slight. My reason for mentioning it here today is not because I fear that it might happen but because it exemplifies an unfulfilled opportunity that we simply must correct. Instead of separation, we must go in exactly the opposite direction. We must broaden and strengthen the unity of all forces in the United States that work on behalf of cultural resources, and we must make more effective league with those forces that struggle to preserve nature, protect scenic beauty, and provide recreation. I believe that the only possible federal basis for such a broad approach in the twenty-first-century United States will be the National Park Service.

Let's look for a moment at some of the problems and opportunities we hold in common.

The atmospheric pollution that kills forests and poisons waters also accelerates deterioration of certain building materials. Marble and bronze are especially vulnerable. The 2,200 statues, monuments, and memorials in the U.S. National Parks suffer the same fate as the tens of thousands on town squares and in cemeteries throughout the nation. We assume that these treasures are permanent, but a statue or building that might have lasted 10 generations will last only 6 generations under today's acid rain conditions. A statue that cost \$52,000 in 1907 would cost \$527,000 today. If we lose them, most will not be replaced. Could we solve this problem better separately than we can together?

A combination of population growth and increased mobility is wreaking havoc upon natural, cultural, scenic, and recreational resources at all levels. There are early signs that the worst impact of the baby boom upon housing and other development may be drawing to a close, but remember that the effects of demographic change occur over a very long term. If current trends

continue, the United States will reach zero population growth, but not until halfway through the twenty-first century, when there will be 30 million more of us. Many more small historic towns will grow into metropolises; many more historic battlefields and archeological sites will become subdivisions and shopping malls; and far more watershed, wildlife habitat, and scenic beauty will be lost before the desperate fathering of the early 1940s has run its full course.

I mention greater mobility. I presume it is good that more people are able to have one house as a residence and another as a retreat. While this is still only a small minority of the population, it is enough to have an impact upon parks, historic properties, and other park-related resources. Equally important is the mobility that comes from electronic communication advances. During last summer's Yellowstone fires, I saw a television interview of one man who lived in West Yellowstone, Montana, and who by electronic means ran a business in Southern California. People with a similar ability to choose where they will live are legion, and guess where they choose to live: on the edge of a national park, in a beach house, next to a wild river, or in a quaint historic village.

These forces and others have expanded suburbia into exurbia. The same combination of forces that one year ago threatened to put a shopping mall on historic ground at Manassas, 30 miles from Washington, D.C., was simultaneously threatening the National Historic Landmark village of Waterford, Virginia, 50 miles away. These forces are now skirmishing at America's most unspoiled major battlefield at Antietam, 65 miles to the northwest, and at Brandy Station, 60 miles southwest of downtown Washington. And when I say the same forces, that sometimes has a very literal meaning. Like Lee and Grant from the Wilderness to Appomattox, it has gotten to be the same faces and the same issue; only the courtrooms

are different.

This is by no means exclusively an eastern problem. Who would ever have believed that sleepy little Tucson would have grown up and surrounded Saguaro National Monument?

We have twin problems. The units of the National Park System rely in large measure upon a century-old assumption that the parks are protected by their locations in remote areas. But that assumption has been invalid for 40 years. We need a new approach. The historic preservation programs of the 59 states, territories, and similar jurisdictions have grown dramatically in strength and effectiveness. Yet the statutory basis of those programs rests upon a 30-year-old assumption that historic properties need protection primarily from projects funded by the federal government. That assumption has been invalid for more than ten years. We need a new approach.

No place today is remote enough to be protected by remoteness, and the greatest threats to historic properties, natural resources, scenic values, and the National Parks comes not from federal agencies but from private parties doing private things on private lands. Park and other resource values, which are critical to the long-term well-being of the nation, are at the mercy of individuals. Individuals are granted only a few short years on this earth, and they understandably have short-term ideas about the utility of property. In a few states, serious land-use planning programs are trying to deal with the problem. In most states such matters are left entirely to local governments, and these governments are often more interested in short-term tax-base increases than in long-term concerns. In too many places, no one at all is thinking about it except as they see and regret losses.

Under present law, the federal government has no authority to regulate private property in order to protect units of the

National Park System and other important resources. I am far too pragmatic to urge an authoritarian approach in today's political environment. Congress has tried twice and failed to legislate such protection in the last dozen years. Some day the American public will demand strong protection, but not until far greater losses have been suffered. In the meantime we must use the tools at hand. Hence my topic, "Opportunities for Cooperative Approaches."

Some of the tools at hand are underestimated. The historic preservation programs the National Park Service has developed in partnership with state and local governments and the private sector have achieved a strength and sophistication that are fully understood by very few. It was this partnership, so recently disdained by those who wanted to work securely within park boundaries, that rose up nationwide a year ago and forced Congress to rescue Manassas. This partnership has thousands of levers of power that can get the desired decision in Congress, in the state house, in city hall, or in the corporate boardroom. Where federal authority ends, this partnership can call upon the authority of a sovereign state. Where state authority ends, the authority of local government to regulate growth and property can be brought to bear. And where authority of any kind ends, the political, economic, and moral strength of a broad-based, middle-class, conservative-but-committed citizen movement can take over. It is my personal goal to bring this federal-state-local and private partnership to a point where it can more effectively help protect units of the National Park System.

What does the National Park Service have to offer the partners in return for such impressive gains? The Service has experience and expertise in managing cultural resources. Although we are drastically short of expertise in comparison to our needs, we are well supplied with it in comparison to other

institutions. The Service also is the single focal point of all official historic preservation activity in the United States. This circumstance enables us to understand and to find solutions to historic preservation problems on a scale several times broader than anyone else. Only the National Park Service is in a position to share nationwide, through technical information, solutions to problems worked out by individuals throughout the nation and can assure that the solutions will not be disapproved by some higher authority.

Above all, the National Park Service is able to offer a popularity that can be translated into strength. We have our flaws and we make our errors, but the American public—indeed the global public—loves the parks and the people who run them. As a somewhat mixed case in point, let me tell you that the forest fire season of 1989 has burned far more acres than the season of 1988. Yet how much coverage have you seen in the media compared to last year, when the mother park was stricken? And if you have followed the 1989 news carefully, much of the coverage is in the genre of "I have been to Yellowstone and nature still reigns—the National Park Service fire management policy was right after all." The fondness in American hearts for the National Parks, and the support they give the National Park Service, could give the larger historic preservation partnership a political base available nowhere else. I view the National Park Service as what Theodore Roosevelt meant by the term "a bully pulpit," and it is my personal goal to use it on behalf of our state, local, and private partners and the historic properties they struggle to preserve.

What is being done to bring this change about, and what sort of things might be accomplished? Many things are being done, but two are of overarching importance. First, we are working to remove, or at least to reconcile, the differences between the cultural resource management planning the

Service does inside the National Parks and the statewide historic preservation planning the Service sponsors in every state. A state historic preservation plan is no longer something you write in a book. Instead, we are evolving it into a system for understanding the historic properties of a state and for making decisions about them. I believe this system holds enormous potential as a model for protection of resources. Within the National Park System, we are now conducting pilot projects on a new approach to both the natural and cultural resource management planning. This new approach will enable us to understand better and preserve the resources within the parks, and it will also be more compatible with state historic preservation planning.

The second overarching change is to improve the system the Service uses to comply with Section 106 of the National Historic Preservation Act. Our present system is good, but is difficult for states to understand. Because by law the states participate in the Section 106 process, which requires all federal agencies to consult the state historic preservation officer when a federal project affects a historic property, any misunderstanding can harm the partnership. It is my personal goal to make the relationship between park superintendents and state historic preservation officers so close and so mutually beneficial that Section 106 compliance will be effortless.

For what needs to be done next, I hope to see park superintendents undertake cooperative ventures with the state historic preservation officers, the 500 local historic preservation commissions, the state and local historic preservation societies or citizen organizations, local property owners, business people, economic development organizations, and just plain citizens to agree

upon and implement Historic Conservation Districts that would include and surround the National Park units. The value of a National Park unit is so great and so self-evident that I believe an invincible consensus can be developed on behalf of protecting the park in almost every case. I know that in some places this consensus will be very difficult—and linear parks will only be able to do it for one segment at a time. When the chips are down, however, a National Park unit is among the most permanent and stable entities to be found. Other land uses are temporary. Although the advocates for harmful short-range projects are often well connected and powerful, the Historic Conservation District will put them on an even plane with the well-connected and powerful historic preservation network. The combination of park and preservation networks, properly handled, is capable of prevailing against any opponent.

That, in abbreviated form, is my proposal. I have a similar vision for cooperation with a network of natural resource advocates, scenic beauty advocates, and outdoor recreation advocates. Those networks exist, but they are far less cohesive, and person-for-person less effective, than the historic preservation network. You can see, I hope, why I believe the key to historic preservation and other environmental protection lies not in independent agencies but in unity within and around the National Park System. That battlefield on the Little Bighorn River might today be known as Custer's Victory had he not in the pursuit of glory split his forces and attacked a larger force. Let those of us who care about the quality of life on earth—in linear parks, square ones, or circles—not repeat Custer's mistakes.

America's Surprising Greenways

Noel Grove, Senior Assistant Editor, *National Geographic Magazine*, Washington, D.C.

I work for the *National Geographic* magazine, and when people discover that fact, a number of questions pop into their minds. So I think I'll just answer them right now so we can save time in the social hour that follows this dinner.

Yes, I travel a lot. No, I don't take all those beautiful pictures. From the completion of a project until it appears in the magazine is a period of about six months—what we call “lead time” in the trade. And to some of you who have known me over the past two years, no, I haven't yet written the greenways article.

And yes, I have had quite a few adventures working for the *National Geographic*. I have been charged by a rhino. I have been held up by road bandits in a place called North Yemen. I have wrestled alligators in the Louisiana bayous to help U.S. Fish and Wildlife officers tag them between the toes. And not too long ago I rode to the front lines in Angola in a Cuban troop truck, transferred to a Russian armored personnel carrier, and reach the front lines where I had to dodge U.S.-financed artillery fired by the other side. So the job is adventurous but gets a little confusing sometimes. I have also come to realize that my favorite assignments are covering the exciting things now happening where the environment is concerned in the United States. Besides, people generally keep their appointments here, and the phones work.

I've had a few surprises in my career with the *National Geographic*, and I'd like to talk to you about surprises tonight. Iceland, I found, is not very icy and Greenland is. Early in my career, I felt my credentials were not yet complete if I did not go to Africa. So I desperately sought and obtained assignment to Nigeria, which was not the

Africa that I had always pictured but overcrowded, with underorganized cities, and not-so-very scenic countryside almost devoid of wildlife.

My experiences in the rain forests of Venezuela, on the other hand, were everything I expected and more. And although the disappearance of rain forests is of concern to us all, their physical extent was . . . surprising to me. The first time I flew over them in a small plane for several hours, I gradually realized that I had drunk too much of that delicious Venezuelan coffee for breakfast. Nature was calling me desperately, and I don't mean that solid carpet of vegetation 9,000 feet beneath us. It was more complicated than you might imagine, because the young pilot had brought with him his very beautiful girlfriend. So finally, when after the fifth or sixth time I had called out “How far to Ciudad Guyana?” and he answered “About 45 minutes,” with great embarrassment I had to say, “I don't think I can make it,” and I explained why. He shrugged, looked out the window, and put the plane into a swooping dive that leveled out at a tiny air strip carved out of the bush. It was the only air strip, he told me later, within hours of flying time, and we just happened to be over it.

Some weeks later I skipped the morning coffee when I flew an even longer journey from Caracas to the Orinoco River to spend a week with a group of Yanomamo Indians. This trip held one of my biggest surprises. I knew they were primitive; I knew they had been visited by only one or two people who were not Yanomamo like themselves, including the anthropologist who agreed to take me there. Still, I was so surprised by the differences in our cultures, so shocked at being face to face with the Stone Age,

that for five days I couldn't take a note.

I hunted with them. We communicated in gestures and body language and through the anthropologist, who spoke their language. I even learned a few words of their language. I ate with them, passing courteously on the live bugs, thank you very much. We became friends. At the end of that incredible period of time, I was sorting out my things and loading up my pack, and one of my new friends was squatting in the dirt beside me. He picked up a paper matchbook with a picture of modern Caracas on it, with skyscrapers and tiny people and he asked me "Shori, wedi ka ta?" "Friend, what is this?"

"Caracas," I answered. He looked at it a moment longer and said, "Caracas-teri," which means, "The village of Caracas." I guess I expected him to be awed and amazed at so mammoth and modern a village, but he dismissed it by tossing it back in my pile. What did he care about another big, strange, funny-looking village that looked like it didn't have a single monkey—which they eat—and looked far from good hunting grounds for tapir or peccary. You see, the Yanomamo was not interested because he was supremely adapted, adjusted and comfortable in his world.

And we are not. We have created a new world, not unlike the Caracas on the matchbook, a world of noise and pollution and concrete. Most of us, nearly 80 percent of us, live in this world, or something like it. Maybe some day we will evolve into some kind of totally urban creature, totally at home, psychologically adapted to a crowded, stacked-up environment, but we're not there yet, not by a long shot, and personally I hope we never get there.

We have been gradually losing touch with the natural world, and the effect on our psyches is recorded in the daily newspaper and on the television screen. Yes, the rain forest has caimans and piranhas and carnivorous cats and poisonous snakes, but where safety is concerned, I have felt less

fear in the rain forest than in the concrete jungles of our cities. Crime, debilitating and dangerous drug use, and many types of aberrant social behavior are all evidence, I believe, of stress caused by living in a crowded and unnatural environment.

That's my personal opinion, but it's backed up in the laboratory as well. Some years ago the University of Maryland conducted experiments with mice, overcrowding them in a sterile environment, and observed much different behavior from another group in a stimulating and less crowded environment. The crowded mice, reported the researchers, manifested unusual hostility to each other, homosexuality, and radical behavior among the young that was likened to rodent juvenile delinquency. In another unfortunate comparison to our own experience, scientists elsewhere have found that the brains of rats grow larger when they are raised in a semi-natural environment as opposed to a boring cage.

I've spent a lot of time in the outdoors for the *National Geographic* and personally witnessed its effect on myself and others. A couple of years ago I wrote an article on the Appalachian Trail and walked about 500 miles of it. In all that time I never encountered a single sorehead on the trail. Virtually everyone I encountered was relaxed and enjoying themselves. The effect is not immediate, but it is real. We live behind four walls, often behind locked doors, and it's a bit unsettling to sleep in the open by yourself in the woods. I had camped outside many times, but it always takes a few nights before I am comfortable sleeping outside. But after weeks of living outdoors, I can honestly say that I have never known such peace, such a sense of well-being. And that effect can be felt, perhaps to a lesser extent, if we can get in touch with the natural world for even a few moments every day.

On the Appalachian Trail I met a young couple who worked as social workers. We camped together a couple of nights and

hiked together by day, so we had a lot of time to talk. They told me they had once had an arrangement with a Philadelphia court in which youthful offenders from the inner city could have a choice between spending their time in jail or spending a month with the couple in the wilderness. Naturally many of them chose the latter. And when a big enough group was gathered, the couple would take them on a long wilderness experience, hiking, camping, canoeing.

They told me that remarkable things happened to those tough inner-city kids in the woods. The first couple of days they retained their tough appearance, their jive talk. But after a couple of days something began to break down. They became unsure of themselves in this very different world, and at night, when the kids were asleep, the couple would occasionally hear whimpering coming from the tents. By the end of the month they had a new set of values: they dropped the tough veneer; they were more sociable; they were curious about the world around them. I wish the story could end there. Unfortunately, they went back to their urban environment at the end of the month, and peer pressure soon put them back in their original mode. No one in the inner city understood or cared about their experience in the woods.

I think we are all here because we believe in grass and woods, winding paths, scenic rivers, and parkways, and what they can do for us. That's what the greenways movement is all about, and it's happening all over this country. Greenways are many things; they serve many purposes, but I think if you want to trace the reasons for the incredible success of building greenways in America, you have to boil it down to this: they allow a highly urbanized population to get back in touch with some semblance of the natural world.

It has been my privilege over the past couple of years to monitor the activity in building greenways in the United States. I

have traveled to all major points of the compass discovering what people perceive to be greenways, and how they are creating them.

Let me give you a little background if I may on the *National Geographic's* involvement in covering the greenway story. As some of you know, Gilbert Grosvenor, Chief Executive Officer of the *National Geographic*, served as co-chairman of the recent President's Commission on Americans Outdoors (PCAO). That commission was named by former President Reagan in 1985 to determine what Americans expected in the way of outdoor activity, and what they hoped to see achieved. After some 20 public hearings around the country in which they heard thousands of words of testimony and the examination of numerous papers written on the subject, the commission published its findings.

One of the most popular and most talked-about findings was that there is a demand for green corridors that connect existing park lands and that connect people in urban areas with the natural world. Such corridors were being built in the country when the PCAO was making that decision, but time after time in my travels on this subject, those involved in greenway activity suggested to me that the encouragement of greenways by the PCAO had a major impact on construction of them.

I was asked to look into greenways and see if there was enough material to make an article for the *National Geographic* magazine. I made some calls around the country, got a feel for the extent of greenway activity under way and the amount of diversity it offered, and reported that yes, in my opinion this would make a story for us. I undertook an off-and-on coverage, interrupted frequently by other assignments and office duties, but basically I ranged over this country when I could, looking into greenways in some fifteen states. Photographer Phil Schermeister, I think, has gone to some states that I didn't visit, and perhaps vice-

versa, but in any event I think we have looked at a fair representation of what is happening.

I began this evening by talking about surprises. There has been no more pleasant surprise in all my years of coverage than in seeing what is happening in the building of greenways. Yes, I had recommended to the *Geographic* that this trend would make a story, but I was not prepared for the enthusiasm that I encountered, for the extent of the work being done, for the implications represented by these threads of green that can tie together this whole country.

I've bicycled on rail-to-trail conversions in Iowa that were almost crowded with smiling hikers and bikers in the early evening, out with their families from the city for a taste of bucolic countryside. I've ridden on the Platte River Greenway through Denver at lunchtime, and it was crowded with office workers reconnecting with the outdoors for an hour or so before going back to work. Believe me, it's a lot more refreshing than a two-martini lunch. I went for an evening run on a brand-new greenway along the Yakima River in Yakima, Washington, then returned to my room in a motel that deliberately situated itself near the greenway so its guests could make use of the facility, an example of growing awareness on the part of developers that greenways and careful planning offer some commercial advantages as well.

Some projects are modest but terribly effective, like the five-mile greenway pioneered by Anne Lusk through Stowe, Vermont. Some are enormous, such as the evolving 200-mile Katy Trail in Missouri and California's exciting plans for a 500-mile ridge trail in the San Francisco Bay area that would touch on 102 communities in nine counties. The Hudson Valley Greenway in New York State is not a trail but a plan for linear connectors in an entire 155-mile corridor in that scenic valley.

Large or small, the effect of greenways on people who use them is obvious. I had an

identical experience happen to me on opposite ends of the country that illustrates this point. I was walking with Dick Trudeau on the Managa-Lafayette Trail north of San Francisco, a seven-and-a-half-mile trail that gets incredible use by an overall community of about 120,000 people. On weekends it is sometimes used by 6,000 to 7,000 people; on weekdays it is used heavily by commuters. As we were walking we were approached by a group of young people, and Dick said to me, "You watch, I'll bet they'll give us some kind of greeting." And right on cue, couldn't have been more perfectly scripted, they did, big smiles, a "good afternoon," and we passed each other. Weeks later in Stowe, Vermont, Anne Lusk and I were walking the asphalt pathway. "It's the strangest thing," said Anne, "on town sidewalks strangers make eye contact, but that's all. On the path they speak, smile, pet each other's dogs." In less than a minute along came a couple that Annie did not know; sure enough, big smiles, a greeting, and since Annie's the kind whose enthusiasm gets everyone in the act, I leaned over and gave their dog a pat.

Folks, the outdoors, the natural world, nature, whatever you want to call it, makes people feel good about themselves, and about others. I don't have to tell you that, you are outdoors people or you wouldn't be here. Incidentally, surveys have shown that a majority of Americans—and remember that most of us now live in cities and urban areas—describe themselves as outdoor people. What people say they are and what they do are sometimes two different things. We've got to give them access to the outdoors to reap the benefits they know are there.

That is happening in some very unexpected places. I spent a couple of days last week with people of the Trust for Public Lands (TPL) in New York. TPL is helping people buy deteriorated land in the inner city to put to use as greenways. They and the citizens groups they advise are urging

municipal governments to create greenways out of land that reverted to the city because of defaulted property taxes in the urban fiscal crises of the 1960s and '70s.

At one point, Robert Feder, a TPL staff member, took me to a bridge on 174th Street, and we looked down on a section of the Bronx River that had nice foliage, some weeping willows, some young locusts, and a slowly flowing current dappled by a few early fallen leaves. All around us swirled loud traffic, and a few yards back from the river were decayed houses and trash, but here was a peaceful, even colorful, section of the Bronx River. "Look at that," he said. "You know, if you were deaf, and had blinders on, and didn't have to look through this cyclone fence, that could be the Suwannee River."

He's right, you know. With a little care, a pathway, and a canoe franchise, that could be a recreational resource in the middle of the Bronx, a place to get away from the city just for a few moments. By the way, I've been in several of these inner-city riverine systems, and, because they are lower than the land around them, even with traffic running nearby they are usually strangely quiet. Elsewhere I waded through trash and weeds with TPL staff people on the waterfronts of Long Island Sound and the Bronx River to see what is being planned as the Bronx River Walkway. "Sure there are security problems," they said, "but we don't think you delay a project like this because of security problems. The important thing is to get the land now so you can make plans for it later."

And that's what's happening all over this country. But there are problems. There are impediments. There are attitudes to change and commercial interests that do not always see beyond their own pocketbooks. Let me give you an example.

In April of this year I was returning from the West Coast on a flight that passed over Salt Lake City. We were passing just to

the side of it, looking up against the mountains, so it was a beautiful view of the city. I am always particularly interested in seeing how a city is laid out, how livable it looks, how easy it might be to escape from, and I was happy to see that there did indeed appear to be quite a few open spaces fairly near the city proper. I was at the window seat, and I became aware that another gentleman in the seat next to me was also looking down at Salt Lake City, taking in this confluence of urban and rural. Suddenly he spoke and said, "Still quite a bit to be developed, isn't there."

I was struck by the difference in our attitudes. I saw open spaces that I hoped could be preserved. He saw empty spaces waiting to be filled. So the battle is not yet won. But it is under way. People in this country are going to their governments and insisting on open space. "It's a complicated process," one of the TPL people told me in New York. "You've got funding battles, and turf battles between different agencies, and sometimes you don't know where a project stands, you just proceed on faith and bank on cumulative pressures to get the job done."

Pressure from the people is getting the job done, and many of you people here are doing it. I mentioned earlier that greenway activity in this country has certain important implications, and I think the implication is this: I see it as an early indication that the people of this country are saying, "We've had enough of rampant development and messing up our land. We want open spaces, we want green spaces, and we want to connect them. In short, they're going to their governments and saying, "We want this country back, and we want it more livable."

That's what I see happening with greenways, and that's why I find covering it for the *Geographic* so exciting. My article on the subject is scheduled for April 1990. Tune in for more details.

Bikeways as an Environmental Tool

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INTRODUCTION

The Netherlands, a country the size of Pennsylvania, has a population of about 15 million. During the first decades of this century, riding a bike was a privilege. By the thirties, bikes were well established and had become taxed items. The situation changed dramatically between 1965 and 1975. Today, every third Dutchman has a car. This demonstrates that the bike has not been appreciated as a means of transportation, despite the fact that almost everybody has a bicycle.

Since the seventies, bike use has changed from being an individual means of transportation to being a means for short trips to local shops, schools, or railway stations. Uses for recreation, sport, and as a toy for children are still increasing. The growing number of traffic jams highlights the advantages of bikes. For example, the beach of Zandvoort is within reach on a bike to 150,000 inhabitants of Haarlem. On bikeways, there is no congestion from recreational traffic to the beach, while cars are lined up bumper to bumper on the adjacent highway. In 1984, 10 percent of all person-miles in the country was produced on bikes.

Today, about 40 percent of the car trips in The Netherlands are shorter than three miles. In the Dutch climate, this is the standard maximum distance for a non-recreational trip on a bike. This situation makes promotion of bike transportation, as opposed to car transportation, a political goal. Promoting recreation on bikes serves this policy as well, especially because a lot of recreational tracks can also be used for economical trips. To defend the public space and spend government funds allotted to bike

transportation wisely, several bike unions were founded, such as the ENFB for traffic safety in local areas, the LF for long distance bike tracks, and the ANWB to obtain rights for bikers.¹

The tourist department of the ANWB-Union has become a national coordination point for activities such as the development of bike tracks, production of bike maps, and the location and maintenance of "bike finger" sign posts. This kind of work is subsidized by both local and national governments. In 1988, the Dutch state sponsored the bike finger posts project, coordinated by the ANWB, with \$300,000 in funds. Today, there are about 470 bikeways in The Netherlands, including a long distance bikeway network of about 3,500 miles. In fact, the Frisian mud-flat island Schiermonnikoog allows only those recreationists who will walk or bike, quite a change for guests from the USA.

Through their concern about environmental problems, the Dutch became increasingly aware of the fact that biking produces hardly any noise. But bikes are also favorable for personal health. On a bike you burn some fat and do not produce a lot of waste to be left behind in nature. Judging by the low amount of litter one usually finds, bikeways may be the cleanest linear parks.

WHY BIKEWAYS?

Environment

Using a bike is such a normal part of the Dutch way of living that most politicians forget that safe bike use demands a proper infrastructure. Moreover, the rapidly increasing environmental problems point everybody to the fact that transportation by bike does not produce noise, NO_x, CO_x, or even dioxin.

Part of the pollution problem, therefore, can be answered as follows:

1. increase bike use for short, local trips;
2. convert fitness training to low-energy-consuming exercises like rowing or biking;
3. locate recreation and work short distances from homes and public transportation; and
4. improve the network of low-energy-consuming transportation systems (i.e., rail and bicycle routes).

The Dutch state recently subsidized the improvement of the local bicycle network in the town of Delft. This construction resulted in a 1 percent increase in bicycle transportation for distance, shorter than three miles. This project stabilized the decline of bike use in Delft at about 40%. Today, the national proportion of bike travel for

distances shorter than three miles is about 35%, with overall bike use of about 25%. Some 90% of the 85,000 Delft inhabitants live within this bike reach of the local recreation project, Delftse Hout. On the national level, the Dutch state has a policy of discouraging the use of fossil energy by promoting "vacations in your own country." Measures to promote bike transportation include the possibility of taking a bike with you on the train, and Rent-A-Bike (\$3.00/day) at railway stations, of which 62 have a connection with regional bicycle routes.

Public Health

A still growing number of "joggers" travel by bike, most of them in small groups and on racing bikes. This practice may be healthy, but the cycling speeds of these racing groups pose a threat to touring cyclists. The use of new fibre fabrics and shapes like



Figure 1. Rent-a-Bike stations are situated near regional bikeways and sell bike maps and information about local recreation topics.

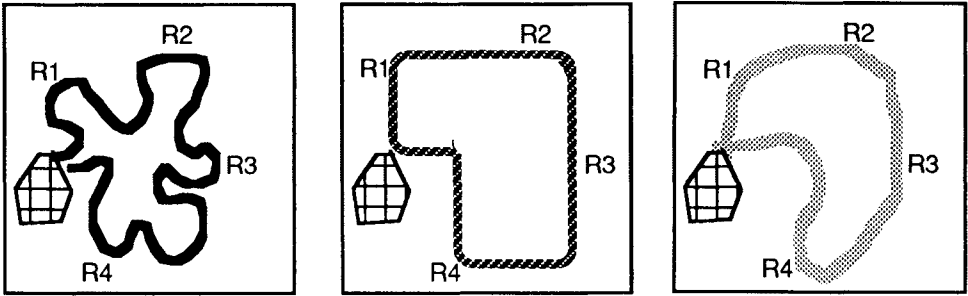


Figure 2.

Route selection to shorten the "travel time" is a standard habit of low-speed (human powered) transportation. Planners should anticipate this habit and shape bikeways as a compromise between the shortest route and the shortest connection between recreation locations R1-R4. (left) Bikeway with too many detours; (middle) a dull circular and orthogonal bikeway; (right) compromise between landscape scenery and direct routing.

the mountain bike gave sporting on a bike a new excitement. Nevertheless, mountain bikes appear to be inconvenient for longer tours and are seldom seen on the national tracks.

WHERE ARE BIKEWAYS?

Climate and Landscape

Bikes have a human motor. In cold and hot weather, this engine may be reliable but not very efficient. Rain also lessens the body's ability to act like a motor. Strong winds and steep or long slopes wear out the human body. A basic requirement for intensive use of bikeways is a landscape without many slopes. In the windy Dutch climate, we also learned the importance of wind protection. The 21 windy miles along the protective dike of our central lake form a real barrier against long-distance recreation.

Zoning and Gradients

A speciality of bikeways is the light construction of their foundation. For reasonable costs, a bikeway can cross areas with a bad subsoil. This light construction will have little impact on the environment.

In several landscapes, the preservation of the succeeding gradients is required to maintain their regional quality. A balance between recreational use and road maintenance can be achieved through the distinction of perpendicular and parallel routings. The roads with a heavy environmental impact have to cross the site by the shortest connection, most of the time a perpendicular line. Light roads can follow "ecolines" (gradients), covering a greater distance in a parallel direction and creating fewer problems. An extra advantage for bikeways is that tracks parallel to gradient zones meet less steep slopes and therefore need few expensive constructions like bridges. Abandoned railway tracks make excellent routes for bikeways, because they were planned with these objectives in mind.

The problem of parallel or perpendicular use of the Dutch dunes-and-coast landscape was for years a big issue. The general vulnerability of the salt-sprayed sandy coastal zone ended in the decision to make few short perpendicular roads for car access to the beach. Between Zandvoort and The Hague, over 30 miles, only bikeways may be built within one mile of the sea. The perpendicular car roads stop at parking lots

that provide direct access to the parallel bikeways in the dunes.

PLANNING CONSIDERATIONS

Biking: A Circular Path for Linear Motion?

Research by the Institute voor Stedebouwkundig Onderzoek (ISO)², based on the “revealed preference approach,” allowed an estimate of the relative importance of choice factors by comparing actually chosen and non-chosen alternatives. This study generally showed that travel time is the most important motivation in selecting routes in a network. This choice factor stems from the dependence on the human body as a motor during a trip.

The second choice factor in selecting a bike route is the quality of the pavement. Again, there is a direct relationship with the human body. A soft or bumpy pavement

makes biking tiring. These choice factors point to planning tools such as connecting recreation elements for bicycles with direct lines, avoiding long or steep slopes, and paving bikeways with a smooth and fast top-layer. Other choice factors that have little relation to the human body, such as the road profile (or type of bikeway) and crowding, had a low score in the ISO study.

The average bicycle speed is between 10 and 20 miles an hour. Depending on the time available, there are three length scales for bikeways:

- Outing trip
(or “trimming”) 5-20 miles
- Half-day trip 20-40 miles
- Whole-day trip 40-80 miles

The above-mentioned choice factor, short travel time, means that all these three bikeway types should have a layout that gives users the feeling of directness. This

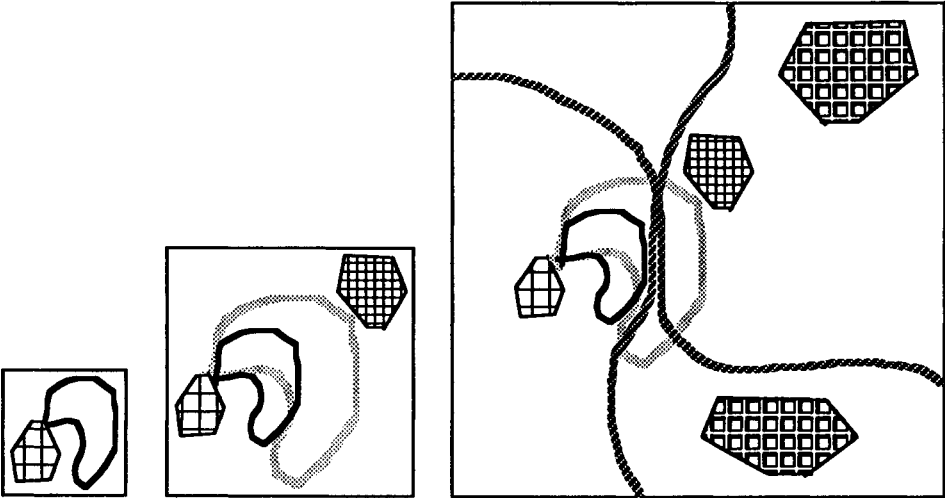


Figure 3.

From left to right, three bikeway types (same scale): (left) In black a local bicycle round with its start and end in a residential area; (middle) A dotted line a regional bicycle route (for half-or whole-day recreation) with its start and end at a home, a parking lot, or a station; (right) In striped lines parts of (inter)national bicycle tracks (for more days of recreation) with night stops along the track.

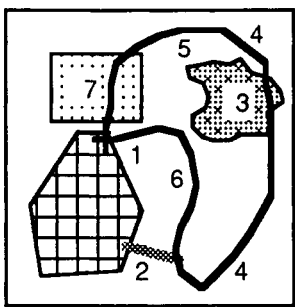


Figure 4.
Most local bikeways are circular (5-20 miles) with several detours to the town (1,2) and with a route that connects recreation objects such as a lake (3), pubs/restaurants (4), deer-park/belvedere (5,6), and sporting fields (7).

preference requires that bikeways be based on linear routing.

LOCAL BICYCLE ROUNDS

A Dutch local bicycle round is more or less a rural track near residential areas and is mainly used by the inhabitants of these areas. Parts of the local round can be used by regional and national touring bicyclists.

The realization and maintenance of such local rounds are often the responsibility of the local park or greenbelt caretakers. Quite often, a completely car-free layout is possible.

Residents of a typical Dutch town, Gouda (population 60,000), make rather long trips.³

Recreation time from home on a Dutch local bicycle round

Maximum 1.5 hours	25%
Maximum 2.5 hours	50%
Maximum "cycle about" of 3.75 hours	75%

Stops are one of the most important activities during such local tours. In the Gouda situation, 70% of the cyclists make at least one stop.

Recreational stops on a standard Dutch local bicycle round

No stops	30%
One stop	50%
Two stops	15%
Four or five stops	2%

Activities during a recreational cycle about on a local bicycle round

Visiting a restaurant of a pub	32%
Sitting in or near the verge	19%
Detouring to visit a friend or family	13%

Bicycles have a low speed. To promote bike use towards greenbelt recreation, it is important to make shortcuts between built up (high density) areas and recreational destinations. In the Dutch town of Delft (85,000 inhabitants), the local bicycle network is repeatedly short-cutted with the local bicycle round. These shortcuts are so attractive to cars that special auto-barriers had to be constructed.

REGIONAL BICYCLE ROUTES

Most Dutch regional bicycle routes are composed of relatively uncrowded rural roads with free bike paths through a beautiful landscape. The route will be planned as a chain connecting interesting views and historical points of interest. The general length is 20 miles. If possible, part of a local bicycle round will be integrated with bikeways on the regional and national scale. Most of the time, the ANWB Union takes care of the situation and maintenance of the bike finger-posts (signs) for regional bikeways. Simultaneous information billboards (often in a rural style) are placed at the starting points and at places of special interest. Generally, the bikeway is followed clockwise. On the average, six finger-posts are required per mile. On bikeways longer than 60 miles, mileage information is also given on the finger-posts.

(INTER)NATIONAL BICYCLE TRAILS

Even on a bike, The Netherlands can be crossed in two days. So the Dutch Long Distance Bikeways (“Langeafstand Fietspaden” = LF Trails), must be seen as part of an international network. Despite its small size and large population, Holland does offer an interesting landscape. In particular, the “wet & dry” gradients (such as salt/sweet, salt/dry, sweet/dry) and the flatness of the landscape make it possible to enjoy a variety of LF’s.

The design tools for LF’s are roughly the same as for local and regional bikeways. What differs is the number of users. This allows most LF’s to follow rather narrow and cheap connections between the local and regional bikeways.

The cooperation between Belgium and The Netherlands resulted in Long Distance

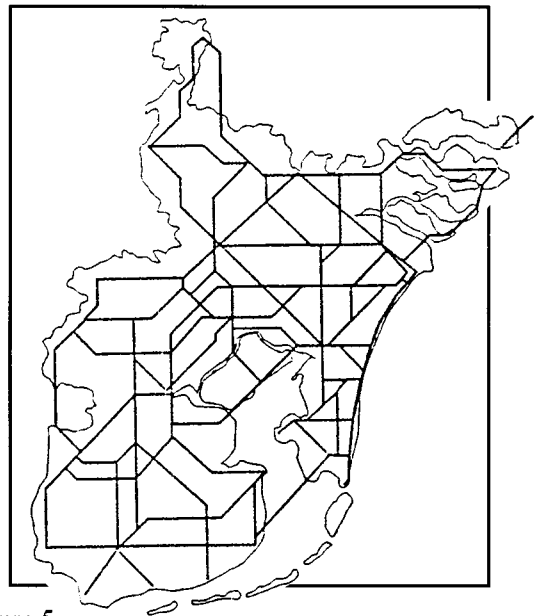


Figure 5.

(left) Bike finger-posts of the Long Distance Bikeways LF-1 along the North Sea.

(right) Structural map of the rather dense Dutch Long Distance Bikeway network.

Bikeway LF-1 Northsea along the coast of these two countries. The route penetrates natural parks that are not accessible by car. The route is so successful that an extension into France is under study

TIPS FOR THE LAYOUT OF BIKEWAYS

Protection and Social Control

The Dutch climate is rather mild, but quite often rainy. One strategy for coping with this weather consists of building a shelter every third mile. The presence of a telephone provides a sense of security.

A new kind of social problem is the increase of bike racing and speed training in groups. This kind of crowding leads to conflicts between racers and recreation-oriented cyclists. Some national parks have started to close their gates to racers. Handy planning tools to counter racing in groups are, amongst others, a narrow profile (maximum 3-5 feet) of brick pavement, hated by racing cyclists.

Slopes, Pavement, and Maintenance

Although a lot of cyclists use biking to get into shape, they don't like very steep slopes. This is one of the reasons that old railway tracks are preferable as bikeway

trails. An unusual form of bikeway recreation occurs on the rail tracks in Varmland and Halsingland, Sweden, where two people can rent a "drazine." This bike is like a small rail lorry, prepared for a two-person camping holiday along these disused rail tracks.

Long slopes should have a much lower incline than short slopes. The beginning, end, and every 100 yards along a slope are appropriate locations for rest points, especially when the rest points provide a beautiful view of the landscape. As a minimum, a rest point should contain a simple bench, a dust-bin, and some stands to park and lock bikes.

Bikes do not have much of a suspension system. This design makes all kinds of bikes dependent upon the quality and maintenance of the bikeway. Among the ten most important goals for bikeway maintenance, six items are mentioned that demand a smooth and fast top layer.

Top Ten Priorities and Solutions for Bikeway Maintenance

- 1. Cleaning of dirt (and glass): Accessible to light, motorized cleaning tools.
- 2. Free profile: Pruning and trimming of greens and verges.
- 3. Smooth (parallel) profile: Good foundation and drainage

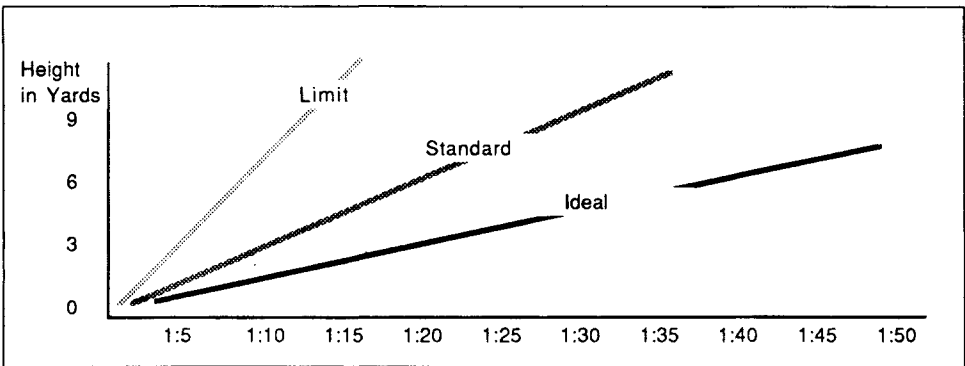


Figure 6. Relation between slope and comfort of a bikeway.⁴

4. No cracks: Direct repair
5. No slipperiness: Direct cleaning of snow and leaves
6. Good night sight: Street lamps at treacherous points
7. Smooth joints: Direct repair
8. No puddles: Good drainage and smooth surface
9. Routing information: Bike-finger-posts and fences
10. No ruts: Less than 4% slopes, direct repair

Width and Profile

Most cyclists prefer free bikeways wider than 1.5 yards. Figure seven shows a relation found in free bikeways by the ICW⁶ between the capacity of a bikeway in relation to its width.

In an ideal situation, the width of a main bikeway will be 2.75-3.00m (about 3 yards). This makes mechanical maintenance and snow plowing easy. To allow for the increasing presence of bike luggage trailers, the minimum width of a bridge or narrow part of a bike trail must be three feet. In certain situations, such as on a dike, a narrow

bike path is a better solution than routing bike traffic to a multi-purpose road. The connection of a suburb with a local bicycle round or the intermediates that link some regional bicycle routes to national bicycle trails may be narrower. A minimum is three feet. When easy passing of another bike is necessary, the minimum should be six feet.

On the other hand, the width of a bikeway can be a handy planning tool to limit its usage. When the maintenance does not require motorized vehicles, a three-foot "mini-bikeway" where you have to get off your bike to pass another person, automatically limits the use to less than one bike each minute. Over short distances (5 to 30 yards), extremely narrow paths are possible at crowded trails. Typically Dutch is a narrow bike-bridge built in a culvert to cross a turnpike.

In nature parks, unauthorized cycling across vulnerable areas tends to be infrequent. Cyclists do not like to leave their bikes alone there, either. The National Park De Kennemerduinen, between Haarlem and Zandvoort has very few fences. Park managers discovered that just planting some spiny plants or depositing dead stumps and branches is enough to block mass trespassing in the land adjacent to the bikeways.

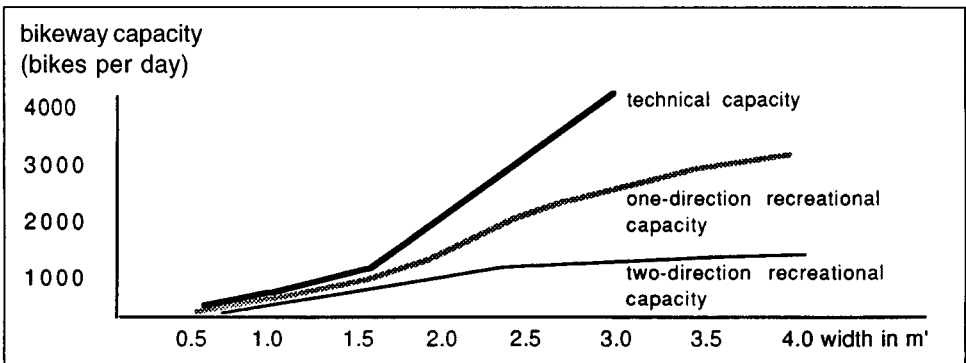


Figure 7. Relation between Technical and Recreational Capacity with the Width of a Bikeway.

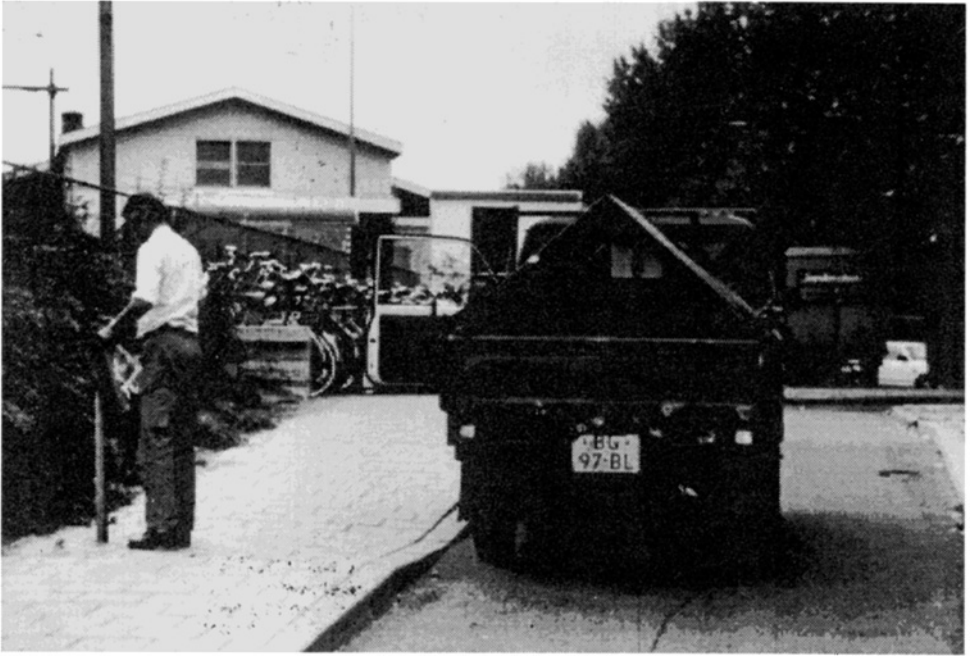


Figure 8. Accessibility of bikeways by small motorized maintenance tools is important. Collecting debris on a Delft bikeway.

CAPACITY, SAFETY, AND CROWDING

In our rather small country with a high population, most destinations are close by. This results in a high percentage of bikes on rural multi-purpose roads. On the political level in The Netherlands, a higher risk for accidents is accepted for business trips than for recreational trips. Thus, the limitation on motorized traffic depends upon the type of road.⁷ In most Dutch rural and recreational areas, the speed-limit is 80 km/h (50 miles/h). But Dutch roads are narrow and people tend to drive too fast.

Crowding from vehicular traffic should determine when to separate bikes from cars with painted bike lanes, or, even better, to

build a road with separate bikeways. The acceptable crowding level has become a political item. Another planning factor is the crowding that tourists on a bike sense from the number of other recreational bikes on their bikeway. This kind of hindrance can be considered another form of crowding.

Gramman's investigation about crowding on bikeways⁸ showed that the opinion of crowding among Dutch bicyclists differed by age, sex, group size, and the kind of bike recreation. More bikes on a track do not affect the "crowding sense" significantly, whereas cars and light motor-bikes make the score much higher.⁹ Cars contribute to more than 60% of all the crowding sensed by cyclists on rural multi-purpose roads.

ENDNOTES

1. This text is partly based on an interview of Mr. Molenaar of the ANWB.
2. Bovy, P. H. L., and D. N. den Adel. "Routekeuzegedrag van fietsers" ("Route choice behavior of bicyclists"). ISO, Delft Universitaire Press, Delft, 1985.
3. Klinkers, P. M. A., "Rondritten van recreatieve fietsers" (Local recreational bike trips"). Information brochure of The Staring Centre, Recreation and Tourism Department, Wageningen, 1989.
4. Verkeers memorandum ANWB no. 4: Fietspaden en oversteekplaatsen.
5. "Onderhoud fietspaden" ("Maintenance of bikeways"). S. V. T.—Mededeling no. 40, Driebergen, 1989; (since 1987 published by CROW, Wageningen).
6. van Alderwegen, H. A.; "Capaciteit van wegen en paden voor recreatief fietsen" (Capacity of roads and bikeways for recreational bike use). ICW; Wageningen, 1981.
7. *Ibid.*
8. Gramann, J. H. "Toward a behavioral theory of crowding in outdoor recreation: an evaluation and synthesis of research." *Leisure Sciences* 5(2): 109-126.
9. Klinkers, P. M. A., ir. A van Hoorn. "Sociale capaciteit onvoldoende draagvlak bepaling fietsaanbod" ("Crowding no base for capacity of bikeways"). Staring Centrum, Dept. of Recreation and Tourism, *Recreatie en Toerisme*, 1989 nr. 5: pages XX-XXII; ANWB, The Hague.

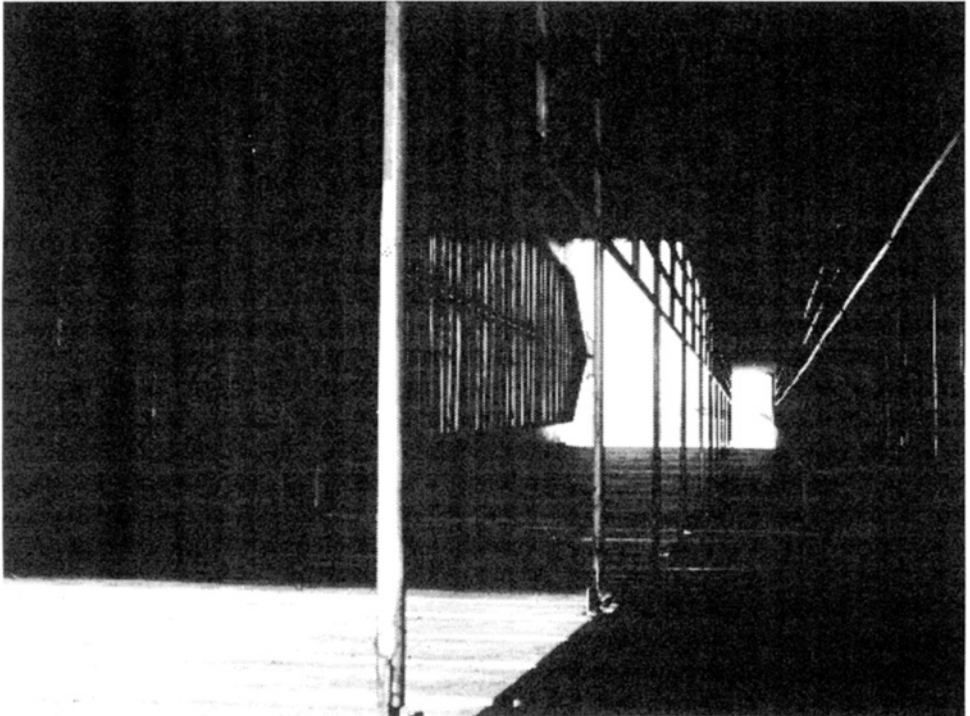


Figure 9. Narrow bike bridge inside a culvert as a cheap way to construct a crossing.

Landscape Architects as Regional Artists

Grant Jones, FASLA Vice-President; Principal, Jones & Jones

It's certainly a pleasure to be here in such beautiful country. This is great golf country, and that's got my attention, because I am a golfer. I'm not a great striker of the ball, but I can hit it pretty far. The pro at my club says that distance will come to me. It's reassuring to know that the older I get, the further I'll be able to go. In fact, it's just a matter of time before I will go *too* far! That's how I want you to remember this brief talk: "He really went too far this time."

But my pro also said that it's not how far I hit the ball, but how it gets there from here—the quality of the trip. In a sense, that's the "Way More Beautiful"—pushing the limits of a linear experience with minimum energy, maximum distance, but a quality experience rich in nuances, free of distractions—a spatial immersion from start to finish, along a sort of linear paradise.

So it's a very great pleasure for me to join this wonderful crowd of linear people and to have an opportunity to represent the ASLA, as well as to talk to you about how landscape architects have roles as artists of the "Way More Beautiful."

DEFINING THE WAY

Before making my pitch for landscape architecture, I would like to define my terms. Just what is the Way More Beautiful? It's a path, a route, a highway, or a byway. It can be a river, but probably not a pipeline or transmission line; it's a passage, a journey, a trip, or a mission; a quest, or just a road to adventure. It can even be a life-style, but implied is a form of paradise, a home or hearth, which gives access to the past and secures the future.

We're not talking about something that you can just buy, that you can possess.

We're talking about being possessed by the landscape. Frost said that "The land was our's before we were the land's," referring back to when we first came over from Europe. By now, we might be able to say, "We are the land's, what's left of it."

WHAT IS A LANDSCAPE

Left of it? What's left of it? The landscape. What's a landscape? Well, the Indians say it's Mother Earth under Father Sky, and it's clothed with a skin of soil, covered by vegetation, adapting to some regime of water, the interactive result of climate. It supports wildlife societies, including human life societies, although these human societies can be connected or unconnected to the rest of this wedding tapestry formed between Mother Earth and Father Sky. We love it when we do feel connected. That is, when we're travelling the Way More Beautiful.

But just what is a landscape in the sense of what landscape architecture deals with as a profession? A landscape is not landscaping. It is also not just a piece of real estate. I like to say that just as in real estate, where success is determined by three cardinal factors known as "location, location, and location," a successful landscape depends upon three cardinal factors known as "place, place, and place"—past, present, and future.

So a landscape is a place in time. It is not landscaping, but a home with a future. A home for plants and animals. The landscape is a habitat. Working as artists with a medium such as this, we must think like stewards. If we are really capable artists, we will maintain our debt to the landscape as our medium of expression. Sometimes, though, we humans, because we are the only animal that can

change its habitat, which allows us to live wherever we want to live, outside the constraints of habitat choice, somehow lead ourselves to believe that other animals are free to transport themselves out of habitats within which they are captive. Animals are not separate from habitats, they are inseparable from it. Although this human animal can carry its habitat's essentials with it—even roaming along at nearly the speed of sound through a hostile, non life-sustaining atmosphere from Seattle to the Appalachian Mountains to stand before you at a lovely luncheon—we too will perish without our habitat, which includes the path to grandfather's house as well as the parkway to the mountains and the greenway down the river to the sea, along the Way More Beautiful.

EACH OF US IS A LANDSCAPE

So, each animal is interlocked with a habitat, each animal is a landscape. So are we, each of us humans, landscapes. We have a wonderful old saying in America. It probably came out of these hills. "You can take the boy out of the country, but you can't take the country out of the boy." That "country" is a landscape that remains within us. It shaped our characters and it tells our story.

HOW DOES THE ARTIST IN US FIND HIS OR HER WAY?

. . . to Contribute to the Way
More Beautiful?

Artists often have a habit of sketching in pencil first, making outlines of forms, the main elements, their massing and proportions, their flow. In the landscape, our job should be looking for the lines. The pencil marks are already on the canvas. The Earth is the canvas, and the forms and processes under, in, and on the land provide the lines.

The weather is the lighting, air conditioning, and ventilation in the studio. We can go with the flow or against it. We can enhance the grain or cut across it. Really good artists work *with* the medium. They paint or sculpt or weave or compose with it. They express its characteristics, even reveal its story.

THE ESKIMO CARVER

The artist of the landscape is like the Eskimo carver, who, finding a weathered piece of Walrus tusk on a remote Bering Sea beach, turns it over and over in his hand, studying its seemingly random features, its cracks and blemishes, its lines. Hours and days may pass before he sees what the ivory "wants to be." He then releases its identity. With the fewest deft strokes, the seal, caribou, wolf, or ptarmigan residing there suddenly pops out, barely disturbing the old weathered tusk. Its integrity is still preserved. The artist of the landscape, like the carver, is also a translator, looking for discourse in the landscape, making the plot more readable, outlining the chapters and presenting the story. A well-designed greenway trail along a river can be like a light, illuminating paragraph after paragraph in the river's story. A poorly designed river trail facility can render the story meaningless or even obliterate its original, rich meaning.

NOOKSACK ROMANCE

Some of you know that I have a romantic attachment to rivers, particularly since one called the Nooksack captured me about 1973. This river flows off the glaciers of a 10,000-foot mountain in Washington State and into the sea between Seattle and Vancouver, British Columbia. We at Jones & Jones were asked to study this river and to identify which segments of its bed and shores should be purchased. Three million dollars would be spent to protect its most valuable lands.

We had to justify where and why. I remember sitting on the banks of the South Fork on a beautiful day in late August with my partner Ilze Jones, and with Brian Gray, John Furtado, and Rick Fackler, talking about what makes a river tick and how we might get to know this river and understand ways to recognize and value its assets to justify where the money should be spent. A lot of facts, figures, and statistics were discussed. But I remember being struck with one notion. This river had its own signature. The Nooksack Indians, the Nooksack people, know this river and how it does its thing. So can we. We just had to learn what it was capable of, sort of like an orchestra. We had to find where and how it expressed itself most intensely. In other words, how could we maximize on its own inherent qualities? That was it. Our goal would be to provide the highest quality of river experience wherever we could find it, rather than attempting to identify scenic values or preferences, which can lead to ambiguity and confusion. So that was the notion: Areas possessing high aesthetic quality were assumed to be those that most strongly and distinctly expressed inherent natural process and form. To this day, nobody has convinced me that we were wrong.

From this notion, we established our fundamental hypothesis around which the approach to our work developed: that is, quality of experience (alias beauty, scenic quality, aesthetic value) depends mainly on how intensely the landscape expresses itself. However, a single quantitative level of landscape experience (supply) cannot give the complete picture, since the health of the landscape affects the quality of the experience. We would have to judge the supply of river resources qualitatively by adding this dimension of health—we also called it landscape integrity. We measured it with indicators such as uniqueness, diversity, fragility, and seasonality, and on the negative

side, by human encroachment. Over the next few months, we focused our resources to document the river. Four propositions guided us. I would like to present them to you.

1. Rivers (landscapes) are systemic, and each constitutes a realm which can be identified, delimited, and classified into orders and/or regimes.
2. River channels (landscapes) are predictable in continuum and can be subdivided into distinct segments for analysis.
3. Each distinct river segment (landscape) can be experienced, and the array of natural, cultural, and aesthetic characteristics, which locally contribute to experience, can be quantitatively recorded to establish basic supply or magnitude of characteristics assignable to each of these river segments (landscapes).
4. Each river's (landscape's) basic supply can be evaluated qualitatively according to indicators of health, and as assessment made of the overall landscape assignable to the segment.

ARCHITECTS OF THE LANDSCAPE ARE COMPOSERS

Let me go back to an earlier metaphor. Each river is an orchestra. Each landscape is a symphony. We linear people know that we are immersed in a symphony of knowledge and delight when we travel the byways, walk the ridges, float the rivers. My pitch to you today is that we architects of the landscape are like composers. Designers hear the music in the earth. They ask the question, "What are the themes?". The landscape artist is helpless without the scientist. I like to think that the dependence is mutual. In fact, if the interaction is fruitful, the landscape architect will give form to

scientific concepts.

The scientist (the botanist, biologist, limnologist, geologist, geomorphologist, soil scientist, anthropologist) will inform the artist, opening doors to the artist. The scientist in the dialogue will interpret, remind, recall, and restate ideas, all of which carry the art to new levels.

The artist will inform the scientist, providing new views into old rooms. The artist will write with the language of the scientist, and draw on the lines in the landscape that give shape to the processes familiar to the scientists. Sometimes he might even lead the scientist into new areas, new insights, new connections.

So there is this interweaving going on. The landscape is like a sort of loom. The scientist and the artist, the agency manager and the landscape architect, together should collect and card the wool from the vital threads in the landscape . . . and make the tapestry. You're working with threads. Maybe for you they're strings. Fiddles? It's all in tune with us.

Landscapes are filled with information. They seem to resonate with facts, and they stimulate ideas. Landscapes seem to contain stories that are dormant, lying there ready to be taken just for the asking. Landscapes provoke feelings and invite attachments.

They are filled with metaphor, contain layers of associations, and they allow us to make connections with the past and the future. In other words, they resonate with us, and through us. There is energy in them, and we sense it.

THE CALL OF THE WILD

When we're walking through a landscape, especially when we pause, rest, are still receptive to its sounds and smells, many of us become aware of a tone, a sort of chord, a clock-like beat, a melody. It's more than just the wind in the trees, the sound of

the stream, the chorus of insects, the loon on the lake, the dove in the *palo verdes* along the dry wash. Some people talk about the call of the wild.

THE ENERGY IN A PLACE

These harmonics, this music in a landscape, this spirit in a place, has its own energy. You are in a sort of energy circuit.

EACH CULTURE IS A LANDSCAPE

Cultures are also rooted in landscapes. When we talk about preserving and experiencing the threads of the landscape, we need all the essential filaments, all the beads on the string, including the buildings, which are an integral part of the architecture of the landscape. We don't need modernist imports, but timeless building forms and traditions, which are rooted in the land and are structural adaptations to the bioclimatic forces that shape the landscape. Wherever possible, these threads in the landscapes that we call linear parks, threads that hold the ecosystem together, that provide the critical linkage for wildlife and the continuities in the balance of things, need to include the vernacular adaptations—the cultural weft in the natural warp lines of the tapestry. Landscapes and cultures should resonate together; in many places, we clash. The linear threads celebrated with this concept are lifelines. So, it's like making a symphony, weaving a tapestry, producing an anthology, maybe making a little magic. How far can I go? Are you still with me?

I guess in a way I'm saying "put more art into it." Remember what landscape architects are really good at. We are regional artists. We trace the vital forces in the landscape. In another time, an earlier time, many of us would have been the geomancers laying out roads and cities, placing our

monuments, our observatories, and our observation points so that they resonated with the sun, the wind, the seasons, the forces and the energy flow in nature.

I responded along these lines a couple of months ago when ASLA asked me to write a leadership vision column in their newsletter *LAND—The Landscape Architecture News Digest*, focusing on the role of the landscape architect. I decided to get down to the basics. I'd like to share my column with you. It goes like this:

A FEW STORIES, CHORDS, & VISIONS

What do Darwin, DaVinci, and Buddha have in common? I will tell you a story.

We were floating down the Nisqually. (That's another river like the Nooksack, also named after its American Indian people.)

"What do you do?" he said.

"Well . . . a lot," I said. "It's kind of hard to describe."

"What do you call it?"

"Landscape Architecture," I said, my paddle sowing water necklaces, stitching clouds onto pool shadows.

"What's that?" he said. "Like gardening?"

"No, but there's a lot to cultivate. We're trained to think like students, see like artists, and feel like stewards of the landscape; we're sort of architects of the mind, heart, and spirit."

The river flowed west, toward the East. "You must *like* what you do," he said.

To really practice landscape architecture, to be fully trained, wholly committed, and gainfully deployed is a lifelong cultivation of "Garden Earth." It is our canvas, and I think the challenge is the greatest art form in the relatively short history of human civilization.

We have to have the mind of the scientist or the scientific writer. We are storytellers

looking for stories; we chronicle the landscape and celebrate its elements like a kind of cuisine. We protect, cultivate, grow, and serve the flora and even the fauna of the landscape in the form of botanical gardens, zoological parks, and nature preserves. We lay out trails, design scenic highways and cultural byways—"Roads of Knowledge," I call them—interpreting what's out there, naming, making the landscape friendly, sparking an ethic of respect in the minds of users as we present these living landscape museums to them.

We are artists, creating parks, squares, plazas, *esplanadas*, boulevards, waterfronts, waterfalls, and water gardens. We design living tapestries on which we play, laugh, love, cry, mourn, and dream, feeling the heart's dimensions linked to nature. We landscape architects create places of the heart.

Landscape architects are also stewards and managers of our natural resources, caregivers to wild gardens that refresh the spirit and restore the soul.

A few years ago, Rene Dubos, the great microbiologist, author of *So Human an Animal* (1969 Pulitzer Prize winner), was having lunch with me in my office in Seattle. We had a wonderful time talking about mutual interests, and Rene said, "If I was starting again, I would be a landscape architect. I've always wanted to be one, you know."

Now you know why Rene Dubos, Carl Sandburg, and John Muir have something in common. Each, in his own way, was a landscape architect. Let's not get stuck on Olmsted!

Conferences like this one are essential. They must be interdisciplinary. I believe that until the gulf between scientists and artists is bridged, the future will be very, very uncertain. Art will take science places it can't go alone, and science will take art into realms of wonder. Each discovery will

release the other into new ground. The ground is out there. But the threads to the tapestry are barely hanging together, and they need to be restored. Landscape architects should be the great artists of the century ahead. Scientists and poets should be our cohorts.

We'll have to choose places to live and then listen to those places. Each place is a unique piece of the tapestry of the Earth. Places are not interchangeable, but ideas can migrate. We need a landscape ethic that is based on the thought: "It sustains me, so I protect it. I want to know its language."

But remember, landscape architects are primarily artists. Our title is just fine: "land" is our medium, "scape" as in a presentation

for the eyes, for the mind, and for the spirit to experience, as "architect" to make, to shape, to marry, to build a relationship, to interact with the land as an experience of place.

Design with the threads, with the stories that resonate in them; hear the songs of the Earth. As Barry Lopez, a naturalist and writer from Oregon says,

Your responsibility is not to know the truth, because no one knows the truth: but to set up the story in such a way that the truth can be revealed.

Find and pack your Nooksack, before it's too late. Thank you.

Problems and Solutions of City Street Greening in China

Li Rusheng, Ministry of Construction, Beijing, People's Republic of China

When you are driving or walking down the streets of a Chinese city, no matter how large the city or how wide the street, the most impressive scene is not the street or the buildings along it, but the trees, grasses, and flowers. That "greening" is characteristic of Chinese city streets.

The greening of city streets is an especially important aspect of the greening of an entire city. Because of the lack of green space and the great density of the population, street greening is more important in China than in other countries. According to general statistics at the end of 1988, green space covered 26,000 acres of street land, while the green space in the entire city covered 180,000 acres.

Early in the Zhou and Qin Dynasty (770-206 B.C.), China began to plant trees along both sides of streets, and trees appeared on the roads connecting cities. Since the Han Dynasty (206 B.C.- 25 A.D.), urban construction has been further developed. Trees

were planted on all main streets of capital cities, including Chang An (Xi An) of the Han Dynasty, Luo Yang of the Northern Wei Dynasty (386-534 A.D.), Chang An (Xi An) and Luo Yang of the Tang Dynasty (618-907 A.D.), Dongjing (Kaifeng City of Henan Province) of the Song Dynasty (960-1279 A.D.), Dadu (Beijing) of the Yuan Dynasty (1271-1368 A.D.), and Nanjing and Beijing of the Ming Dynasty (1368-1644 A.D.). Up until the Qing Dynasty (1636-1911 A.D.), many market streets developed in Beijing. There were several design patterns in planting trees; these were known by such terms as "general planting," "key planting," and "sparse planting." Since 1949, especially after the "Greening Campaign of Voluntary Tree Planting" was initiated in 1981, the greening of urban streets has developed more rapidly than in previous years. In development for about 2000 years, a comparatively comprehensive system of urban street greening is present in contemporary China (*See Table 1*).

Table 1.
The proportion between width of urban street greening and selected urban streets.

CITY	NAME OF STREET	STREET WIDTH (meters)	GREENING WIDTH (meters)	PROPORTION
Beijing	San Li He Avenue	70	35	50%
Nanjing	Northern Taiping Street	42	14	33%
Changchun	Freedom Street	57	22	40%
Guangzhou	Dongfeng Street	44	7	12%
Fuzhou	Taijiang Road	40	9	22%
Hefei	Victory Road	46	14	21%
Zhengzhou	Jinshui Road	47	9	20%
Jilin	Jiangnan Street	37	14	38%
Dalian	Zhongshan Road	47	10	21%
Nan Ning	Zhonghua Road	28	6	21%

The system of Chinese urban street greening can be divided into the following types:

1. Street-side trees: Planting one or several lines of trees along one of both sides of the street. This type of planting can be found in almost every Chinese city and town.
2. Pavement Green Spaces: The green spaces between the streets and the fronts of the buildings. Facilities such as chairs and garden furniture are put in these green spaces. These places give citizens good places to rest and enjoy the view (Figure 1).
3. Green spaces segregating driving or riding roads: Located between two driving or riding roads. Generally, one street has one or two greening zones like this. These spaces are set aside mainly for the purpose of sound and

smoke insulation, but also aid in the beautification of the city.

4. Green spaces of squares: The green spaces around the public squares, the squares in front of public buildings, the traffic squares, and the parking areas.
5. Green spaces and small gardens in street corners: The small green spaces beside the main streets for the citizen's spare-time leisure and viewing (Figure 2).
6. Green lands by the water: The greening of river banks through cities, and the greening of the roads at lake-side or seaside. There are two sorts of greening: One is "circling," the other is "opening." Examples of "circling" are Hefei, Jinan, and Xi An's circling urban parks. Examples of "opening" are Haihe Park of Tianjin, Southern Canel Park of Shenyang, and the Binhe Garden of Beijing.

7. Green spaces under airport approach routes: The green areas beneath airplane corridors. These green areas can be divided into the central “green island” and the green space around it (Figure 3).

It has to be pointed out that some of the above-mentioned green spaces have multiple functions. Some of them have played the same role as urban parks.

In general, Chinese urban street-greening projects have functioned far better than overall city development. Although it seems there is nothing to be criticized, there are still many problems to be resolved.

Complaints of landscape architects.

Most urban streets are designed by urban planners or road engineers, and buildings or other facilities are designed by still other specialists. Very little spare land and space is left, which constrains the creative potential

for the landscape. Even the limited creative action possible may be disrupted by other people.

Being puzzled about how to preserve tradition.

We Chinese people often feel proud of our ancient history and culture. Chinese traditional gardening has been extolled along with other national treasures. In a short time, many Chinese pavilions appeared street-side. This change has not only caused financial waste, but has also had vicious ecological effects. This abuse of garden beauty is discouraging.

Lack of artistic features, no “greening within greening.”

Because of the lack of deep comprehension for the ecological and scenic effects, some of the forms of urban street greening are



Figure 1. Side-street trees and pavement green space.

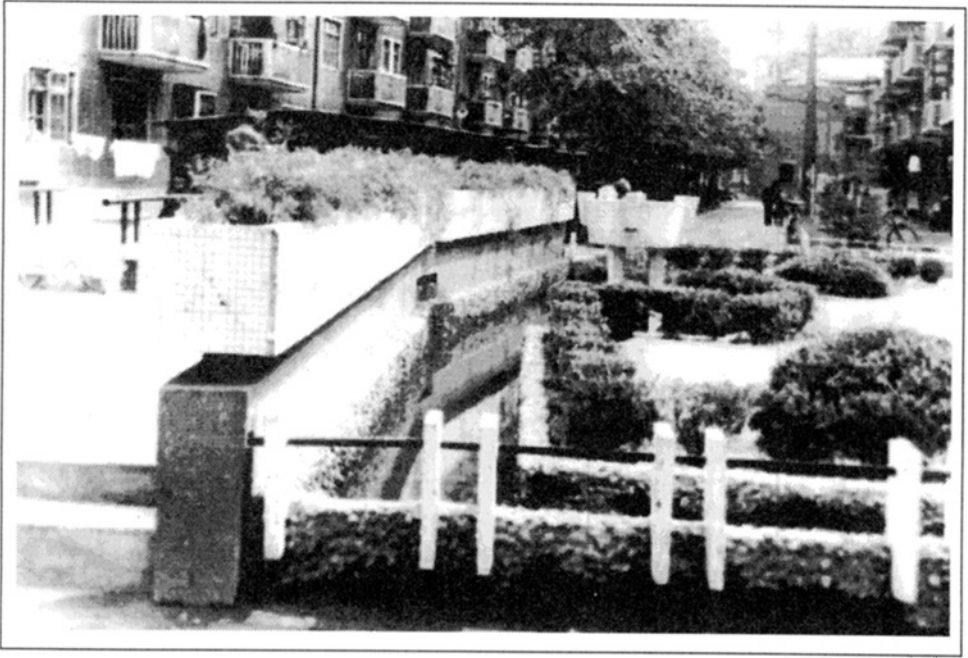


Figure 2. Green spaces and street-corner gardens.

monotonous and repetitive. Some problems are caused by horticultural research. Examples include the low quality of green covering, and lack of care for grass and lower plants.

Lack of Funding.

The funds for greening come from two sources. One is governmental finance and tax income. The other source is the income from administration of urban parks and green space. Because the two funds are not enough for the construction cost of the city street-greening projects, the leaders of Tianjin, Shenyang, Hefei, Xi An, and other cities raised funds and collected manpower and materials from the citizens and enterprises that benefited from the constructed parks or the greening. This approach helped mitigate the problem of insufficient funding.

Disputes over Land.

When there are conflicts between urban street

greening and buildings and other facilities, it is often greening that is conceded. This results from both financial constraints and people's needs.

Where Chinese urban street greening will be heading and how to deal with the above-mentioned problems are the key issues to which we are paying close attention. As we know, urban street greening is a comprehensive task which involves knowledge of botany, ecology, architecture, urban planning, philosophy, psychology, art, and some management technology. Many factors, such as the political-economic system of a society and its historical-cultural background, also have an impact. Landscape architects need to master the related knowledge in order to cooperate with urban planners, architects, engineers, citizens, urban managers, and others.

In order to improve the situation, the following approaches have to be emphasized.

Integrated Planning.

In the planning and designing of Chinese urban street greening, landscape architects have to do their best to deal with different factors, including the ratio between green space and streets to scale, function, and form, and how to deal with different types of streets. Landscape architects have to communicate with experts in related fields. They also have to take part in the designing of urban planning and building projects in order to coordinate street greening with other parts of urban construction and management.

Combination of Science and Art.

We should respect beauty while respecting science. To respect beauty does not mean to pander to somebody's taste, but to create along objective, artistic principles. We should make further use of the successful experiences of our forefathers.

Reasonable Use of Money.

Because of limited funding, we have to use money wisely. The leading emphasis of urban street greening should be on plants, not facilities. Plants not only protect our environment, they also express natural beauty. If we have more money in the future, we should increase urban green space rather than build unnecessary facilities.

Enforcement of Legislation.

Planning, construction, and management of urban street greening should all be based on the law. In order to ensure normal development of street greening and to resolve conflicts between street greening and other urban development, we should formulate and enforce laws and regulations.

Urban street greening leaves much work for us to do. There are a lot of problems to be resolved. However, we are confident that the future urban streets will be green, beautiful, and full of human achievements.



Figure 3. Green space under airport approach routes.

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II. Historical Perspectives

The Mount Vernon Memorial Highway: The Machine in the Modern American Garden

Elizabeth K. Meyer, Harvard University, Cambridge, Massachusetts

The appropriation of technological facts and their subsequent transfiguration into symbols of modernity was a major preoccupation of early twentieth-century artists and architects. Committed to representing the spirit of the age, these designers developed a new formal vocabulary by embracing the machine as technology, the machine as form, the machine as process, and the machine as symbol. Contemporary landscape architects of the era were not initial participants in this process of appropriation. Yet in parkway design, they found an ideal opportunity to explore the meaning of one particular machine, the automobile, in the American landscape.

The synthesis of these seemingly contradictory realms—those of nature and technology—into a unified aesthetic was not a process unique to the twentieth century nor to the parkway. The relationship between two somewhat contradictory, but often complementary, ideals has historically informed the best of garden and landscape design theories. In the past, cultural attitudes towards “city and country,” “culture and nature,” and “architecture and landscape” conditioned landscape design. With the nineteenth century’s industrial advances, technology—as a symbol and as a tool—became a significant counterforce to the pastoral ideal.¹

Landscape and garden designers readily embraced technology as a tool of transformation. The extensive land reclamation required by the century’s great public parks, including Frederick Law Olmsted’s Central Park and Adolphe Alphand’s *Parc des Buttes-Chaumont*, the ambitious forestry program developed for Biltmore by Olmsted and Gifford Pinchot, and the insertion of sanitary sewers and street lighting systems into existing cities, are examples of incorporating

new technology into the landscape. In these instances, technology was a means of creating places compatible with the aesthetic norms of the day. Technology had yet to be consciously appropriated as a symbol of modernity—the machine—in the garden.

This is not to say that isolated occurrences did not exist in the nineteenth century. They could be found in the parks and promenades of Paris, which, under the direction of Alphand and his successor André, celebrated technological advances through the forms of iron street furniture, glass and metal exhibition halls, metal suspension bridges, sophisticated drainage systems, and concrete constructions. In America the parkway, first as an integral part of an urban park system and, eventually, as a linear park in and of itself, also celebrated the technology of the times. From its consideration as an intrusion in the park to its acceptance as a major instrument of leisure activity,² the automobile challenged traditional park and landscape aesthetic theories. As the “sinuous green ribbon’s” curvature was increasingly determined by the speed of the machine as well as by the lay of the land, the parkway represented more than the inclusion or celebration of technology in the landscape. The seemingly contradictory realms of the pastoral ideal and the technological fact were not merely juxtaposed; in the twentieth-century parkway, the technological fact as represented by the automobile was synthesized with the pastoral ideal. This synthesis of what had previously been viewed as antithetical resulted in one of the most powerful symbols of the new machine age.³

A noteworthy and frequently overlooked exemplar of this phase of parkway design is the Mount Vernon Memorial Highway, a

14.5-mile parkway⁴ which parallels the Potomac River from Arlington Memorial Bridge to George Washington's estate in Fairfax County, Virginia (Figure 1). Designed and built between 1928 and 1932, the Mount Vernon Memorial Highway route passed through former industrial sites, marshes, farmland, historic Old Town Alexandria (an early eighteenth-century port city predating Washington, D.C.), rolling woodlands, and small streetcar suburbs. Its ambitious engineering and scientific forestry program, guided by a strong landscape-architectural design philosophy, transformed these disconnected, disparate land uses and land units into a unified riverfront park befitting a memorial to the nation's first president. This paper, an outgrowth of research undertaken for the National Park Service,⁵ will establish the Mount Vernon Memorial Highway's significance as more than a befitting memorial in a historically rich landscape. It aims to establish the Mount Vernon Memorial Highway as the critical link between early twentieth-century regional parkway developments of the Westchester County Parks Commission (WCPC) and the national parkways undertaken by the National Park Service (NPS) and the Bureau of Public Roads (BPR).

In many ways, the Mount Vernon Memorial Highway represents the culmination of the WCPC work. The WCPC success in New York, achieved "more by accident than foresight,"⁶ was codified and transferred to the Mount Vernon staff through shared personnel. Their commitment to enhancing the recreational aspects of driving and to reclaiming river valleys through the most sophisticated available technology epitomized Phoebe Cutler's notion of the "practical and aesthetic coupling"⁷ inherent in parkway design. As a precursor to the "mature parkways" undertaken by the NPS, the Mount Vernon Memorial Highway was a training ground for those concerned with "integrating the art of landscape architecture

and the science of engineering."⁸ Additionally, it provided the first opportunity to design a parkway that not only preserved unique natural resources but also exploited the commemorative and historical associations of the landscape. The Colonial Highway, Skyline Drive, Blue Ridge Parkway, and Natchez Trace projects represent later manifestations of this phenomenon.⁹

Situated in between these two phases of parkway design, the Mount Vernon Memorial Highway embodied the machine age's ideals without rejecting either history or nature. In fact, in the Mount Vernon Memorial Highway, one finds evidence of a possible reconciliation of the machine and the landscape, or the present and the past. Ironically, the automobile, an agent of technology, becomes a means of escaping the city and experiencing the country. It appropriates the countryside as "the motorist's park"¹⁰ (Figure 2). The parkway, a project dependent on a scientific understanding of the automobile and the landscape, is a metaphorical journey through the nation's cultural and environmental history. In order to appreciate the significance of the Mount Vernon Memorial Highway's complex and contradictory metaphor and the merits of its technological innovations, a brief detour in our journey is warranted.

A BRIEF HISTORY OF THE PARKWAY

The Olmsted Parkway (1800-1900)

The "shaded green ribbons"¹¹ which we associate with Olmsted Sr.'s work were informed by the Parisian boulevards he visited with Alphand around 1860. These regularly planted routes with separated carriageways and promenades connected significant city institutions and parks. Their regularity contrasted with Paris's medieval built texture, civilizing it through the provision of sun, light, air, and architectural

verdure. The earliest of American parkways were similarly inserted into the existing city fabric. Eastern Parkway (1866) and Ocean Parkway (1869) in Brooklyn would have provided alternate leisure-travel routes between existing urban parks and proximate natural resources. The two-hundred-ten-foot-wide section recommended for Ocean Parkway suggests that these American parkways were more “landscape” than “urban”; they were not intended to regularize the city but to subvert it. The evolution from these New York City parkway projects to the unrealized Riverside, Illinois, parkway (1869) to Boston’s Fenway and Arborway (1800s) illustrates the gradual pairing of the parkway with unique natural resources rather than with major urban institutions. This development was accompanied by a change in planting distribution—from regularly spaced to informally composed—and in roadway alignment—from integrated into the city grid to an appropriately leisurely, and topographically dependent, serpentine curve. The parkway or boulevard as a regularizing element in the city gave way to the parkway as a picturesque episode in the regular city.

The Transitional Period (1900-1925)

The replacement of the horsedrawn carriage by the automobile had significant ramifications for the use and subsequent form of the parkway. Olmsted Sr.’s observations that “celerity will be of less importance than comfort and convenience of movement” and that “gracefully curved lines, generous spaces, and the absence of sharp corners . . . suggest and imply leisure, contemplativeness and happy tranquility”¹² mark him as a nineteenth-century man. Two of the next generation’s leading landscape architects, John C. Olmsted and Charles W. Eliot, II, wrote articles in *Landscape Architecture Magazine* that dramatize how quickly America was affected by the automobile. While the observations in Olmsted’s article of 1915 were still predicated on horsedrawn

vehicles,¹³ with the publication of Eliot’s 1922 article the “machine age” had begun. In addition to noting the obvious changes in roadway width, scale, alignment, material, and access, Eliot made two perceptive observations: that the moving landscape would replace the static vista as parkway speeds increase, and that the roadway itself—previously a minor character in the parkway—will no longer be subordinate to the park.¹⁴ Both of these developments find expression in the work of Jay Downer and Gilmore Clarke in Westchester County, New York.

Westchester County Parks Commission (1910-1930)

Under the direction of Jay Downer, “the beauty engineer,”¹⁵ a river reclamation project begun in 1907 grew into a regional parkway system of nearly 100 miles. The Bronx River Parkway’s success as “the first convincing demonstration of the bypass highway within a broad projected right of way”¹⁶ was a result of Downer’s skill at balancing the needs of the machine and the lay of the land. By limiting travel to recreational vehicles, the scenic aspects of the adjoining parklands were protected and the property values of adjoining landowners increased. Gilmore Clarke, a recent graduate of Cornell’s landscape design program, joined Downer’s staff as a superintendent of construction in 1916. By 1923, the two were chief engineer and landscape architect for the Westchester County Parkway Commission. In their work on the Bronx River, Saw Mill River, Hutchinson River, and Briarcliff Peekskill parkways, one can see the parkway’s form and detail gradually accommodate faster speeds and new technology. The essential characteristics of these projects included a broad right-of-way, grade-separated intersections, engineered curves,¹⁷ divided roadbeds, and limited access. Uninterrupted recreational travel in an elongated park fulfilled the vision of the nineteenth-century romantic, met the needs

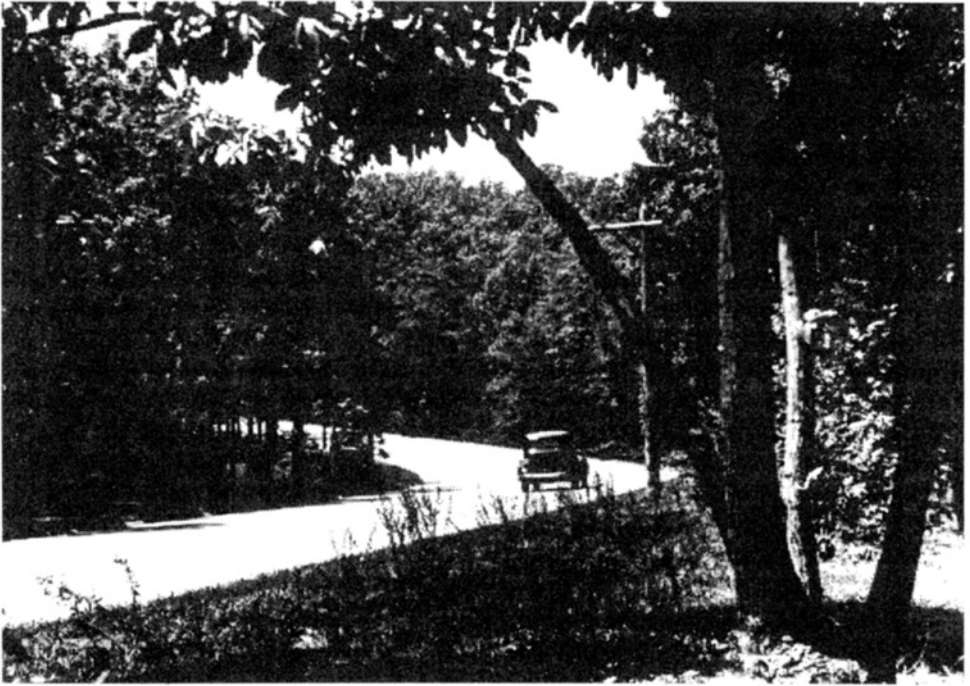


Figure 2. Parkway between Alexandria and Mount Vernon estate.

of the twentieth-century rationalist, and engaged the skills of both the landscape architect and the engineer.

This innovative parkway system was a regional program. While federal monies were available for road construction after the passage of the 1916 Federal Aid to Highways Act, those funds were available only for roadbed construction, not for right-of-way improvements. In the mid-1920s, with an amendment to the 1916 FHA designating funding for highway right-of-ways and with a 1926 National Park Service / Bureau of Public Roads interagency agreement,¹⁸ the legal mechanisms were in place for applying WCPC's lessons on a national scale. Despite Norman Newton's claim that the Skyline Drive was the "first federal parkway," the Mount Vernon Highway warrants that designation. A parkway in all but name, the Mount Vernon Memorial Highway signaled

the beginning of a golden era in federal parkway construction. It was followed by the Skyline Drive, the Blue Ridge Parkway, the Colonial Parkway, the George Washington Memorial Parkway, and the Baltimore Washington Parkway. As a precursor to these better-known parkways, the Mount Vernon Memorial Highway deserves a special place in the history of modern landscape architecture.

THE MOUNT VERNON MEMORIAL HIGHWAY

It is a comprehensive report of the coordinated development of a particular highway problem, showing the essential relationship between the practices of engineering science and principles of landscape art. Experience is proving that the requirements of

good landscape design when embodied in the development of our highways enhances the efficiency of use. . . . Art and science must be harmonized in modern landscape designing.

Wilbur Simonson, 1932 ¹⁹

As a truly modern work of landscape design, the Mount Vernon Memorial Highway did more than merely accommodate the machine within its boundaries. Its designers embraced the machine-as-technology, as evidenced in the extensive dredging landfill necessary to build its miles of isthmuses (Figure 3); they embraced the machine-as-form in the streamlined engineered alignment of the roadway and in the cog-like image of the traffic rotaries and clover leaves (Figure 4); they developed a machine-inspired “fast-track construction” process to ensure project completion by the Washington birthday bicentennial; and they adopted the machine, the automobile, as modern man’s primary instrument of recreation. Paradoxically, the Mount Vernon Memorial Highway team embraced these machine-age values within the context of designing a commemorative memorial. In the early years of the Depression, the nation found strength and vision in the combination of traditional values and technological process.

The Mount Vernon Memorial Highway opened for the two hundredth birthday of George Washington in 1932. Its inauguration represented fifty years of planning by private citizens and public officials. The riverfront route connected dozens of historic sites and buildings associated with the nation’s first president. This linear connection of historic moments—this twentieth-century narrative—did not correspond to an actual historical road. The Virginia shoreline was irregularly contoured, marshy, and punctuated by numerous streams. Consequently, six bridges and two miles of man-made isthmuses—considerable feats of engineering given the project’s time constraints—were necessary

to realize this metaphorical historical journey. The river route from north to south revealed a continuously changing landscape, a cinematographic experience. It captured views of monumental Washington and Arlington Cemetery, offered distant prospects to Haines Point and the Maryland shoreline, framed views of Old Town Alexandria, and revealed the majestic panoramic view of the broadened river at Hunting Creek. Alternating woodland corridors, farmland clearings, and dramatic views to Fort Washington characterized the south half of the Mount Vernon Memorial Highway between Old Town and the Mount Vernon estate entrance. Carefully composed views of the Potomac, revealed through selective clearing and careful roadway alignment, connected the modern traveler to Mount Vernon to the broader region’s natural and cultural history. The Mount Vernon Memorial Highway’s design revealed George Washington’s life story through its alignment. But other characteristics contributed to the procession’s memorial character. These included the width and sectional profile of the roadbed and right-of-way, the landscape planting, the associated architectural structures, and the relationship to adjoining land units.

Realizing an appropriately dignified and memorial landscape within a two-year design and construction schedule required both vision and pragmatism. These attributes were found in Wilbur Simonson, the unknown hero of this project. He was a Cornell graduate with experience working first, for A. D. Taylor, and then, for Jay Downer and Gilmore Clarke at the Westchester County Parks Commission. While Gilmore Clarke, acting as the supervising landscape architect, visited the site once a month, Simonson was responsible for the daily design, supervision, and construction. Cognizant of the need for an instant “memorial” landscape, Simonson relied on sheer tenacity and persuasive diplomacy to push forward a program for

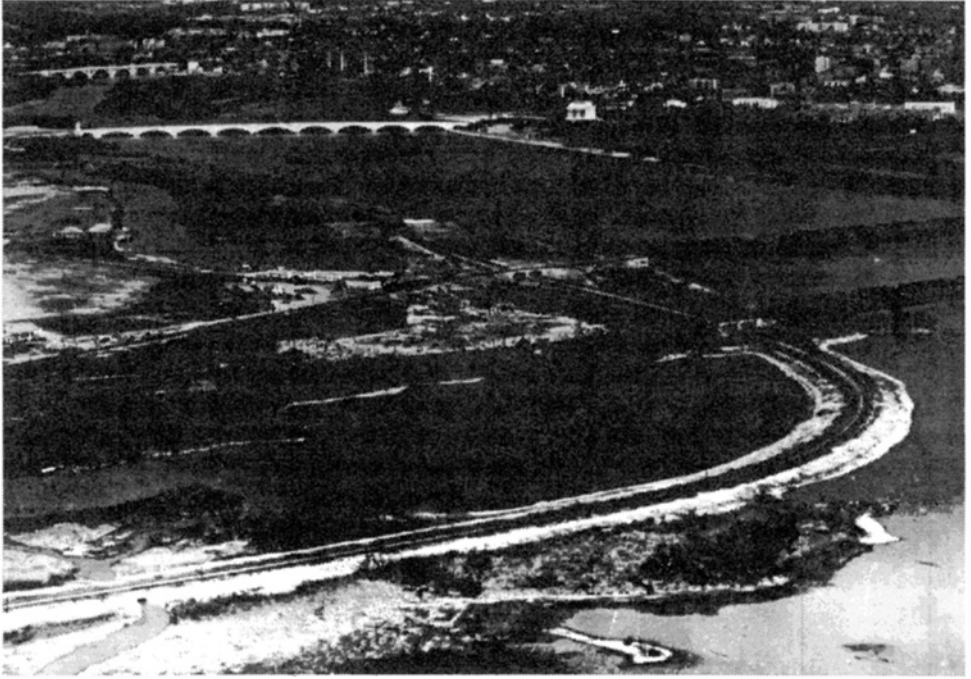


Figure 3. Boundary Channel, 14th Street cloverleaf and Roaches Run landfill.

transplanting over 200 mature trees, for planting over 68,000 new trees and shrubs and over 55,000 vines and groundcovers, and for improving the existing soils with 600 tons of peat, 235 tons of humus, and 108.5 tons of fertilizer.²⁰

But quantity alone did not guarantee Simonson's vision. Just as the roadway alignment incorporated historic sites and significant distant views into the parkway, so did Simonson's choice, mix, and distribution of plantings supplement the existing and adjoining plantations. He systematically studied the native flora as a basis for interpreting the existing landscape patterns. This "ecological or natural landscape approach to the highway planting" had three objectives: "to make the highway strip a mere foreground to the surrounding landscape; to enhance the peculiar qualities in the views and scenery of the surroundings through which a highway passes; and to

avoid the typical static or garden-estate type of plantation design in favor of fitness with the more dynamic requirements of highway travel."²¹ To these ends, the plantings for the areas north of Old Town's former industrial sites and landfill differed from both Old Town's street plantings and the marsh and woodland plantings south of Old Town. With advice from the Department of Agriculture's Beltsville research facility, Simonson and his assistant, Nye,²² determined the proper mix of native plants for the differing soil conditions of woodlands, wetlands, and landfill. An ecologically based process of landscape analysis, soil preparation, and plant selection was vital to the parkway's memorial character.

The parkway's architectural structures—roadway, bridges, and buildings—also served the paradoxical goals of commemoration through technological innovation. The forty-foot-wide roadbed, the dominant built

structure in the parkway, was a marvel of engineering. On dry ground, its concrete surface and three-inch concrete curb carried traffic while collecting surface water into integral inlets. On landfill or in wet areas, the steel reinforced concrete slab was stabilized with wood and steel piles as well as periodic mudjacking.²³ The construction technology, with its drainage structures and structural reinforcing concealed below ground, was, again, significant and vital to the road's stability and dignity. The 14th Street cloverleaf, one of the first in the country, was perhaps the most complex engineering structure in the project. Juxtaposed with the native-stone clad bridges, which appeared as timeless as the landscape, the cloverleaf stood out as a truly modern device.

Finally, the character of the existing eighteenth- and nineteenth-century buildings along Washington Street in Old Town

Alexandria must be considered as part of the Mount Vernon Memorial Highway design. Since the entire city was viewed as a historic site associated with George Washington's life, the conservation of its of its character was of utmost concern. Through innovative legal measures, the federal government assumed the right to review all land use and design changes along Washington Street.²⁴ By relying on the most sophisticated structural, ecological, and legal technology, the Mount Vernon Highway team created a landscape of both its time and of its place. They designed a parkway that celebrated twentieth-century techniques and commemorated eighteenth-century traditions and heroes.

Less noticeable than the physical design and engineering innovations, but equally significant to the history of parkway design, were the procedural innovations developed by the project team. The design process

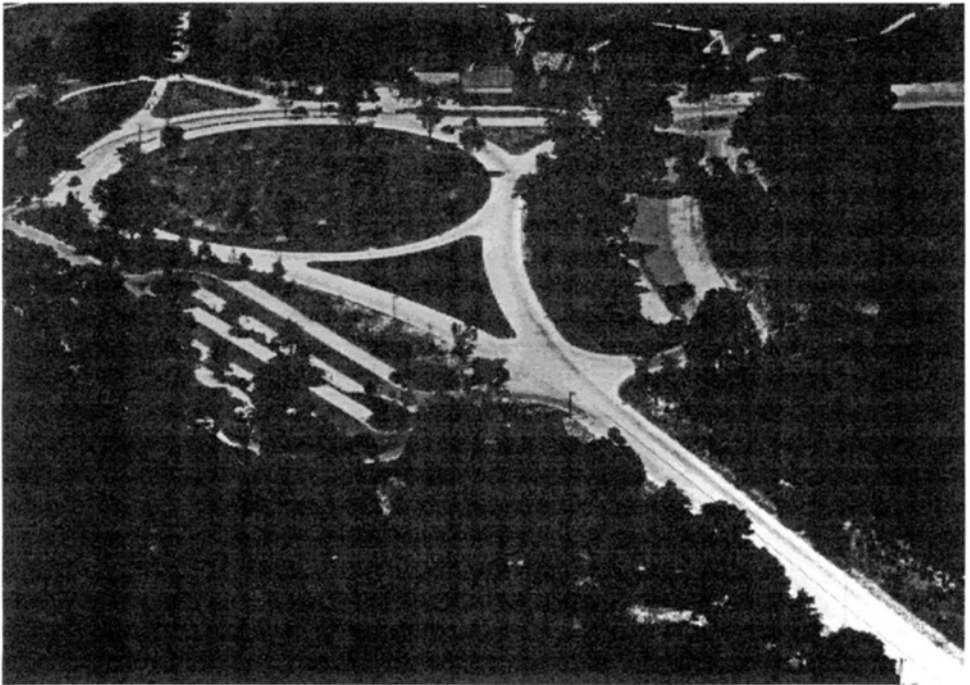


Figure 4. Mount Vernon Memorial Highway terminus.

began with a long-term development plan that encompassed the parkway right-of-way and adjoining properties. The development plan, widely distributed to solicit support for the project from private citizens and the Fine Arts Commission, was a beautiful ink drawing rendered by Wilbur Simonson. Including the Virginia and Maryland shorelines from Georgetown and Anacostia Island to a location south of Mount Vernon, the development plan identified future riverfront parks, the proposed National Airport, and active recreational facilities such as a seaplane harbor, yacht basin, and a golf course. Recommendations for land acquisition and for scenic easement agreements with adjoining land owners supplemented the plan. The most visionary recommendation established the George Washington Memorial Parkway along the Potomac from Great Falls south to Fort Washington and to Mount Vernon, on the Maryland and Virginia shorelines, respectively. The development plan was long-range and regional in its scope, a precursor to the NPS master plan process institutionalized by Vint in the 1930s.

As the project proceeded from planning from planning to design and construction, a

multitude of innovative tools and techniques were employed. Field conditions were verified with aerial photography and extensive photographic documentation. The roadway was laid out at 1"-50' instead of the 1"-200' standard previously used at WCPC. This approach allowed greater mathematical accuracy in roadway centerline calculations. The local ecological analysis and construction engineering feats have already been chronicled. The fast-track construction process required simultaneous designing of the six separate units—riprap and hydraulic filling, grading and drainage, bridges, paving, lighting, and landscape—each of which was bid separately.

The wonder of these design, construction, and management achievements has been captured in many documents. These include the *Final Report* by W. I. Lee and Wilbur Simonson; a documentary film of the construction process; thousands of progress and post-constructions photographs; the project files in the National Archives; and, most recently, a series of interviews with Mr. Simonson, who until his recent death lived in suburban Washington and drove the parkway regularly.



Figure 5. Typical parkway cross section, South of Alexandria.



Figure 6. Intersection of parkway and railroad bridge, Roaches Run.

A CONTEMPORARY ASSESSMENT

One of the tests of the Mount Vernon Memorial Highway's long-term vision is an assessment of the existing parkway's memorial character. Still remarkably intact, especially in the area south of Old Town, and immensely popular as a linear riverfront park, the parkway has suffered from three shortcomings in the original design. The lack of an adequate right-of-way, which was only two hundred feet in most cases, prevented the incorporation of a continuously divided highway and the establishment of a substantial planted edge in some locations. With increased commuter traffic, the lack of a median detracts from both the parkway's leisure nature and its safety. The lack of adequate screening around new development, especially at Old Town's boundaries, also detracts from the parkway's scenic nature. Adjacent residential developments have

resulted in many new intersections along the Mount Vernon Memorial Highway's southern half. Lacking the legal authority to prevent such intrusions, the National Park Service is now required to upgrade the road to accommodate these conditions. The resulting modifications compromise the "limited access" one expects in parkway.

On a positive note, the 1930 Development Plan's predictions concerning adjacent airport and recreational facilities have been rather graciously accommodated. The enlarged National Airport relocated a segment of the parkway, resulting in a wider right-of-way and a new median strip. In that respect, the parkway was actually improved by later development plan implementation. The Daingerfield Island Marina, Jones Point Park, Bellehaven Picnic Area, Marina Dyke March Preserve, and the bicycle path have all enriched the recreational aspects of the parkway.

During the 1980s the Mount Vernon Memorial Highway was the subject of both a Historic Resources Study and a major roadbed improvements program. The first study assisted the National Park Service in documenting the project's significance and in assessing the impact of future proposals. The second program, the first major renovation in the highway's fifty-year history, was intended to improve the parkway's safety without compromising its character.

Both of these developments, research and renovation, have served to increase our understanding of the Mount Vernon Memorial Highway's place in a larger historical context. The renovation efforts have focused the local residents' attention on the fragility of this resource. That heightened awareness will serve the parkway well in years to come. The research has uncovered a wealth of primary source material illuminating a specific project and its designers as well as the broader issue of landscape architecture's contribution to the machine-age aesthetic. The integration of art and technology, the celebration of technology, and the acceptance of the automobile as a vehicle of leisure all

find expression in the parkway's modern landscape. The reconciliation of these concerns with the Mount Vernon Memorial Highway's memorial purpose provides an intriguing paradigm for contemporary design inquiries.

If the original designers' extensive documentation of the Mount Vernon Memorial Highway's intentions and techniques can be seen as an indication of their awareness of this project's potential influence on the nation's highway and parkway improvement program,²⁵ perhaps this contemporary reassessment will serve to remind us of the potential meaning and beauty possible in the transportation landscape. For this is the realm where that landscape, both cultural and natural, is perceived through the lens of speed, and where disparate, isolated facts are spliced together into a continuous and cinematic work of art (Figures 5 and 6). Art and nature. Romance and reason. History and the future. Nostalgia and progress. Pastoral ideals and technology. Leisure and speed. The Machine in the Garden is indeed a powerful metaphor of contradiction.

FOOTNOTES

1. Marx, Leo. *The Machine in the Garden*. London: Oxford University, 1964, p. 25.
2. According to Phoebe Cutler, (*The Public Landscape of the New Deal*. New Haven: Yale University Press, 1985, p. 53), "[t]he National Resource Board claimed that recreation accounted for 60 percent of road use in the United States in 1933."
3. See Wilson, Richard Guy. *The Machine Age in America 1918-1941*. N.Y.: Harry H. Abrams, Inc., 1986, p. 101.
4. Due to the terminology of federal highway funding at the time, the project was called a highway. In form and intention, the Mount Vernon Memorial Highway was a parkway, however.
5. The author, as an associate of EDAW, a landscape architecture firm in Alexandria, Virginia, assisted in researching the Mount Vernon Memorial Highway for a Historic Resources Study from 1986-1987. Other members of the project team included Eliot Rhodeside, Lila Fendrick, Steve Whiteford, Sara McCracken, and Robert Warnock.
6. Downer, Jay, "Principles of Westchester's Parkway System." *Civil Engineering* 4:2 (February 1934) pp. 85-87.
7. Cutler, p. 53.
8. Simonson, Wilbur. *Final Report: Unit VI Landscape*. Washington, D.C.: Bureau of Public Roads, 1932, introduction. This post-construction summary of the highway's history and landscape construction provides invaluable insights into the ideals and the standards of the time.
9. Cutler, p. 57. "In its pursuit of scenery and an idealized past the parkway's fashion broached megalomania."
10. Eliot, Charles W. II. "The Influence of the Automobile on the Design of Park Roads," *Landscape Architecture* 13:1 (October 1922) p. 28.
11. Simpson, Jeffrey and Mary Ellen W. Herr, editors. *Art of the Olmsted Landscape: His Work in New York City*. N.Y.: New York City Landmarks Commission, 1981 p. 34.
12. See Olmsted, Vaux and Co. "Preliminary Report upon the Proposed Suburban Village at Riverside, near Chicago." (N.Y.: Sutton, Browne, and Co., 1868) pp. 3-14, 16-18, 23-29. Excerpt is from S. B. Sutton's *Civilizing American Cities*, MIT Press, 1979.
13. Olmsted, John C. "Classes of Parkways," *Landscape Architecture* 6 (October 1915) pp. 37-48.
14. Eliot, pp. 27-36.
15. From conversation with Wilbur Simonson, supervising landscape architect for the Mount Vernon Memorial Highway.
16. Downer, *ibid*.
17. *Ibid*.
18. From class notes. LAR 803 Site Engineering, Professor Benjamin Howard, University of Virginia, Spring 1978.
19. Simonson, Wilbur. *The Final Report*. Introduction.
20. *Ibid*. These numbers do not include plants collected from adjoining properties or donated plants.
21. Simonson, Wilbur. "Roadside Planting," *Landscape Architecture* 26:4 (July 1936) p. 172.
22. Simonson was assisted by Henry Nye, an experienced plantsman, with the field identification and planting plans. Nye, a WCPC employee, was recommended by Gilmore Clarke.
23. On the Hunting Creek isthmus, an asphalt base was substituted as the extensive landfill setting rendered concreted slabs less practical.
24. The letter of agreement stipulates that all changes on Washington Street must be in keeping with the memorial character of the Mount Vernon Memorial Highway.
25. See Simonson, Wilbur. "Highway Development in Broad Scale Planning," *Landscape Architecture* 43 (July 1953) pp. 162-165.

NOTE: All photographs are from the National Park Service National Capital Region photographic collection.

The Merritt Parkway: A Straight Approach to Beauty

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INTRODUCTION

Connecticut's Merritt Parkway was one of the first highways in the country to simultaneously incorporate beauty and efficiency. Although built a decade after the Bronx River Parkway, generally considered the first true parkway in this country, the Merritt had a significant impact on the parkway concept. In the decades that followed, many highways were built featuring, to varying degrees, the two essential characteristics of the Merritt, high-speed movement and sensitivity to the natural landscape.

The term "parkway" can be applied to any traffic artery, from a landscaped drive with center and side strips of planted ground to a dual-pavement artery completely free of opposing lines of traffic (Condit, 1961). The central planted dividing strip can be traced back, in this country, to the Governor's Palace in Williamsburg, Virginia, and to European precedents. The other essential feature, the two-level intersection, or crossing at separate grades, is credited to Olmsted and Vaux, who employed this innovation in their design for Central Park in New York City. Although these pioneers of American landscape architecture sometimes used the term "parkway" to refer to roadways that were merely more richly furnished than ordinary streets, later they usually applied the term to drives linking parks with the central city or with other parks.

These early parkways, based on European models, might have better been called boulevards. The first designed landscape having the distinguishing characteristics of a modern parkway was the Bronx River Parkway, completed after World War I. The Bronx River Parkway was created as part of a conservation effort to clean up the polluted Bronx River, which had become a home for

garbage, disreputable buildings, and garish advertising. The creation of a park along the river and the construction of a roadway through the park provided motorists an opportunity to experience the revitalized natural beauty of the landscape. A 40-foot-wide roadway, accommodating two lanes of traffic in each direction, was designed for low-speed pleasure driving, with a speed limit originally of 35 miles per hour. Commercial vehicles were not permitted, and the road could be entered or exited only at designated points (Robinson, 1971).

The Bronx River Parkway served as a model for the construction of all subsequent parkways. In the words of its planners, a parkway should "preserve for present and future generations . . . charm and natural beauty . . . [and] provide for the refreshment of the mind and body plus the well being and happiness of the people" (Westchester County Parks Commission, 1924). A parkway, according to Newton (1971), is not itself a road but a strip of land containing a roadway for the movement of passenger but not commercial vehicles. The strip of land is not uniform but varies in width depending on biophysical and cultural conditions. The contained roadway is meant for driving at speeds that permit the driver to enjoy the scenery en route, not to pass through the area in the shortest time possible. Additionally, in contrast to the premodern parkway, the modern parkway is a limited access route; that is, abutting owners are denied access over the parkway strip.

PLANNING OF THE MERRITT PARKWAY

The Merritt Parkway was planned primarily as a high-speed, free-flowing alternative to the Boston Post Road, the only major east-

west highway in Connecticut. Due to the explosion in automobile ownership in the 1920s and early '30s, the highway that followed the shoreline of Long Island Sound, linking coastal towns and cities, had become intolerably cluttered and congested. Between New Haven and the New York state line were strung almost 3000 buildings with direct access to the Boston Post Road. Originally called the Merritt Highway, the Merritt Parkway was conceived as an inland solution that would avoid traffic congestion by bypassing built-up areas.

Several forces caused the Connecticut State Highway Department to build a special type of road rather than just another highway. The 1920s was the deadliest decade in terms of highway accidents per mile driven (Patton, 1986). Consequently, there was a public outcry for better highways more suited to the capabilities of the modern high-speed automobile. The area of Connecticut through which such a road would pass was known for high scenic quality. Many wealthy and influential people who lived in Fairfield County were highly vocal in their opposition to a highway, correctly pointing out the unsightly conditions along the existing Boston Post Road. Other commuters to New York, who had driven on the Bronx River Parkway, pointed to it as a model for Connecticut to emulate. The Connecticut Highway Department itself, judging from its subsequent actions, must have possessed an uncommonly high degree of environmental sensitivity.

It is also quite likely that old-fashioned rivalry and a spirit of human competitiveness was involved. The Merritt Parkway had to connect to the Hutchinson River Parkway in New York and the "boys" in Connecticut wanted to show they could do just as good a job, if not better, as those "uppity so-and-sos" in Westchester County and New York City. To gain support the project was named after long-serving and highly respected Congressman Schuyler Merritt. Certainly

the road had to do him justice.

The economy obviously was important in the '30s. The notion that building a highway would provide work for the unemployed was looked on favorably by state legislators, especially since a good possibility of obtaining federal funds for the project existed. It was also anticipated that building the highway would enhance property values of adjacent real estate, stimulate home construction, and increase tourism. Furthermore, at this time legislation existed for the state government to acquire land for parks but not for roads and highways (Larned, 1988).

HIGHWAY DESIGN

The Merritt Parkway was completed in September 1940 at a cost of slightly more than \$21 million. The State Highway Department claimed the parkway had been built according to the most advanced principles of engineering. The Merritt was designed to have easy grades, banked curves, and straight stretches, offering the motorist a maximum of safety and pleasure and requiring minimum effort on the part of the automobile (Wood, 1935). The highway was constructed on a 300-foot minimum right-of-way (R-O-W) that was bisected into two 150-foot parcels. Construction was limited, innovatively, to the northern half of the R-O-W, with the southern half reserved for possible future expansion. Two 26-foot lanes were built for traffic in each direction, separated by a 23-foot buffer strip. There were no at-grade intersections. Instead, bridges and underpasses were constructed at regular intervals. The road was of the long-tangent-short-curve design: 84 percent of the road was tangential (straight), while only 16 percent was curved. No transition curves were incorporated into the design. The maximum grade was eight percent with an average grade of four percent, and the minimum sight distance was 500 feet at



Figure 1. The Merritt Parkway was laid out predominantly in straight lines.

both vertical and horizontal curves.

Gilmore D. Clarke, consulting landscape architect for New York and the Westchester County Planning Commission, was an outspoken critic of the design. He declared the road was “not even good engineering, to say nothing of parkway planning.” Clarke stated that the highway was like a “giant roller coaster,” marked by ugly cuts and straight lines joined by sets of curves. In saying that the Merritt did not exemplify state-of-the-art highway engineering, Clarke was correct. Technical standards were lower than German freeways of the time, and in New York and Maryland roads were being built with the more advanced long-curve-short-tangent alignment. As a result, the Merritt Parkway has a somewhat kinky appearance due to the abruptness of changes in direction. Subsequently, it was learned that curves at the ends of long tangents can cause accidents, and drivers find long straight sections boring and monotonous.

The ideal solution for fitting a roadway to the topography may be a continuous curvilinear alignment. This design typically consists of long, flat circular curves connected by long, spiral transitions, with approximately two-thirds of the alignment on circular arcs and one-third on spirals. Lorenz suggested this alignment as early as 1940 and used it later for the Aschaffenburg-Nurnberg Autobahn, the German engineering marvel with no straight sections whatsoever. The Hutchinson River Parkway in New York, to which the Merritt Parkway connected, had continuous curvature but with short radii. Since 84 percent of the Merritt was laid out in straight lines, the design was, in a sense, a step backwards. But the Merritt “feels” much more in sympathy with the flow of the landscape than the 84 percent figure suggests. The favorable reception the parkway has received over the years leads one to believe the visual discontinuity of its geometry has not been upsetting to most motorists.

THE MERRITT AND THE LANDSCAPE

In 1938, the governor of Connecticut, Wilbur Cross, referring to the Merritt Parkway, said, “there is no more beautiful or scenic parkway in America.” Many have echoed this sentiment. During the 50-year history of the highway, it has been called, for example, “a national landmark among highways,” “a green tunnel,” and “Queen of the Parkways” (Monagan, 1977). The Merritt has gained these accolades for a number of reasons, the prime one being the way it presents Connecticut’s landscape. The overall goal of the design was to conserve, enhance, and display the landscape through which the highway passed. Southwestern Connecticut is not a dramatic and awe-inspiring landscape; but if it doesn’t thrill, its gently rolling hills and forest vegetation seldom disappoint. In many places mature trees are located close to the edge of the highway, and

frequently these combine with trees in the median to enclose fully the overhead plane of the roadway. On a sunny day, a motorist experiences the pleasant sequential sensation of moving from brightly lit spaces into shaded ones and then out into sunlight again. The lush vegetation strongly contrasts with the meager plantings typically found on a modern high-speed freeway or interstate. The planting of trees so close to the roadway would not be allowed today for safety reasons. This restriction is somewhat ironic, for the Merritt has an excellent safety record, with fewer accidents than comparable stretches of highway meeting engineer-prescribed standards of safe landscaping.

Some of the beauty observed in driving along the parkway today is undoubtedly due to the maturation of plantings made half a century ago. Such is the nature of landscape design. It is certainly true that many majestic and stately trees grace the roadway, although the passage of time can be a two-edged



Figure 2. The parkway has most curves per mile at its western end.

sword. According to A. Earl Wood, the landscape engineer originally in charge of roadside development, many plants close to the roadway have been killed by road salting in recent years. Median trees which motorists have run into have been removed for safety reasons. Attention to maintenance has also waxed and waned over the years. Still, the overarching beauty persists.

Sensitive landscaping was a hallmark of the Merritt project from its inception. A beautification subcommittee of the Fairfield County Planning Association worked closely with the parkway planners. Wood personally communicated with most of the garden and civic clubs in Fairfield County between 1935 and 1941. After the basic layout of the roadway had been established, a team of landscape architects determined tree groups to be saved, selectively thinned, or removed. Tree work was done under the supervision of a trained forester. A minimum of healthy mature trees was removed; small trees and

shrubs were temporarily transplanted and then replanted after road construction. Vistas were cut through the understory to provide glimpses of the countryside as one drove along. Planting was limited to species native to Connecticut: hemlock, pine, dogwood, maple, oak, ash, laurel, rhododendron, ferns, and wildflowers. Special efforts were made to locate plant materials so they would screen the headlights of cars in opposing lanes. Because of this sensitive approach to planting, even the first people to drive along the parkway got the feeling that it had long been there, that the road was wedded to the landscape.

All topsoil was salvaged ahead of construction and used for subsequent landscape improvements. Careful attention was given to slopes so the constructed forms would blend sympathetically with natural grades. Steep slopes were stabilized with native vegetation, especially vines, to resist the forces of erosion. On steep embankments,

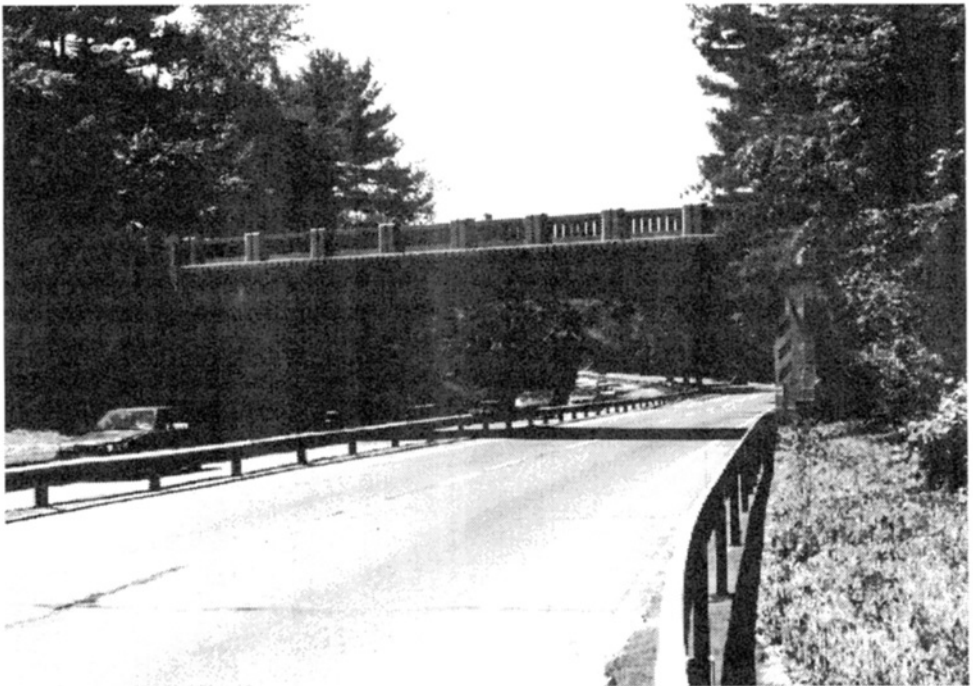


Figure 3. Original bridge George Dunkelberger, architect.

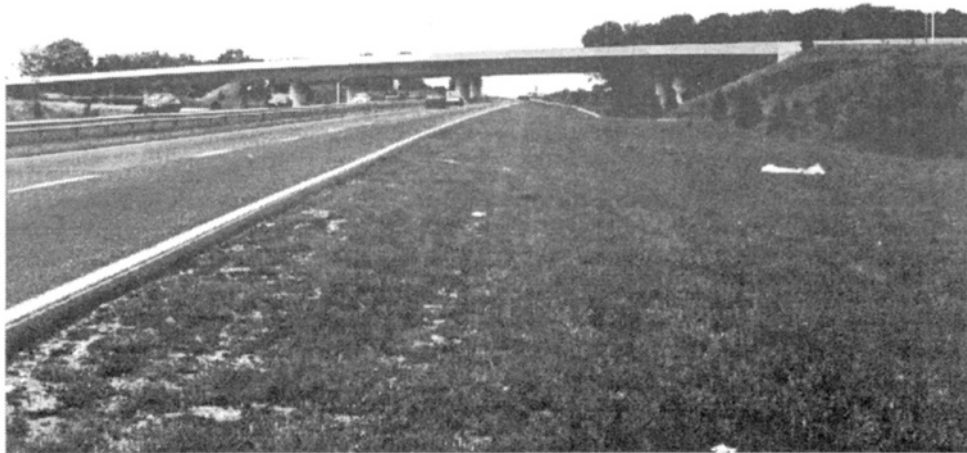


Figure 4. Recently constructed bridge for Connecticut Route 8.

guide fences were constructed from hand-hewn oak. The embankments were not the steep slopes typical of regular highways but rather gentle inclines blending naturally into the terrain. Headwalls were made of native colored stone excavated on the job and mortared with black-tinted mortar. Additionally, a continuous bridle path was formed along the length of the parkway by joining up old woods roads, surveyor's lines, and footpaths.

Thirty-five concrete bridges of the rigid frame-and-arch type were constructed to carry crossroads over the parkway. Each one was adorned with a distinctive facade by George Dunkelberger, the highway department's architect. He used moldings, paneling, and precast concrete ornaments to produce highly detailed art-deco type designs. For the sake of unity, a smaller number of designs might have been better, and would certainly have been less costly, but the department deserves credit for trying

to produce something that pleased the eye and provided a needed function. Dunkelberger's bridges are only 40 to 50 feet wide. They enhance the strong feeling of enclosure one gets in motoring along the parkway. Unfortunately, many of the bridges are now showing the effects of age as water has accumulated behind precast panels and caused them to split. More utilitarian bridges have been added in recent years; the State does not follow the original designs when repairs are made because of prohibitive costs.

The Merritt does not harmonize with the landscape by adhering to the landscape architect's axiom of following the contours. This approach was not possible since the road had to carry traffic in a basically east-west direction while the ridges and valleys in the area run predominantly north-south. Generally the route proceeds perpendicular to the contours, necessitating cutting through outcrops and filling in the crevices, hence the "roller coaster" effect previously

mentioned. The severity of this problem was reduced somewhat by notching ridges and filling the approaches to the notches. The resulting alignment dramatizes the landscape since the driver experiences sequentially the sensations of climbing and descending. Good views are also afforded from the tops of the ridges. The author personally finds the ride quite enjoyable and stimulating, not in the least disturbing.

The Merritt was extended eastward nearly to Hartford by the construction of the Wilbur Cross Parkway (WCP) during the late 1930s and early 1940s. Overall design and engineering of the WCP was patterned after the Merritt Parkway, but in an effort to speed completion and reduce construction costs, less attention was given to landscaping and other design details. The importance of roadside treatment can be seen by comparing the two parkways. There are few trees in the median of the WCP, the shoulders are much wider, and the trees are set further back

along the road edges. Consequently, the sense of enclosure and close contact with the natural landscape one feels on the Merritt Parkway is considerably reduced. The WCP today provides only a small fraction of the experience of landscape afforded by its older and more intimate cousin.

THE MERRITT PARKWAY IN CONTEXT: OTHER PARKWAYS

As described earlier, the first parkway to meet the criteria of a modern parkway was the Bronx River Parkway, completed by the Westchester County Park Commission (WCPC) in 1923. The WCPC also built several other parkways as connectors between units of their park system in the '20s and '30s. During this period, work began in the New York City area that eventually produced a highly developed system of parks, parkways, and expressways. Notable projects included the elevated West



Figure 5. Wilbur Cross Parkway.

Side Expressway (1928-38) and its connector, the scenic Henry Hudson Parkway (1933-36) on the west shore of Manhattan Island. Unfortunately, in recent times many of the parkways have degenerated into commuter routes virtually indistinguishable from the clogged expressways now characteristic of the metropolitan region.

The federal government was also active in parkway construction during the early years. The Mount Vernon Memorial Highway from Washington down the Potomac was built between 1929 and 1932 by the Bureau of Public Roads. The Skyline Drive along the crest of Virginia's Blue Ridge Mountains was begun in 1932 and completed in 1940. In 1936 Congress passed legislation to establish the first national parkway, the Blue Ridge Parkway, connecting Skyline Drive to the Great Smoky Mountains National Park 500 miles to the south. These federal parkways have stayed closest to the original Bronx River Parkway model and continue to be used today primarily as low-speed recreational routes.

Perhaps the best example of a modern successor to the Merritt Parkway is the Garden State Parkway, completed in 1956, which travels the length of New Jersey. Designed by the firm of Clarke and Rapuano, the construction was overseen by Oliver Deakin, landscape architect for the state highway department. The parkway, like the Merritt, was definitely designed for high-speed travel. The design incorporated a number of refined principles of cross section and alignment and featured a long-curve-short-tangent geometry. The medians varied as conditions permitted, from 30 feet in urban sections to as much as 400 feet in rural southern areas. Only indigenous materials were employed in new plantings, and small cuts and fills were given fairly flat slopes to blend naturally with the landscape. The net result of these features is a road of good aesthetic character and efficient traffic flow.

THE MERRITT PARKWAY TODAY

Probably the most significant benefit or pleasure that today's motorist derives from travelling the Merritt Parkway is visual or psychic relief. Compared to a typical modern highway, the parkway is quieter, more coherent, and freer of distractions demanding attention. The plantings along the roadway are so dense, generally, that one cannot see beyond the right-of-way. Oftentimes it seems easier to imagine you are driving across a vast forest rather than through one of the most densely populated regions of the country. Driving on the parkway, the modern motorist is temporarily encapsulated in a "green cocoon," unassailable and immune to the hassles and pressures of everyday existence.

On the other hand, there are a number of interrelated problems associated with driving on the Merritt Parkway today: traffic congestion, high driving speeds, and entering heavy traffic flow from the entrance ramps. The Merritt traverses a densely populated area and normally carries a high volume of traffic, especially during rush hour. Cars in the left lane usually move at or above the legal speed limit of 55 miles per hour. Traffic in the right lane is slightly slower, in part because motorists must be prepared to slow down and allow other cars to enter the parkway. The Merritt Parkway lacks the long onramps and entry lanes found on modern high-speed highways. As a result, cars often must come to a complete stop where the onramp meets the right lane of the parkway, certainly a hazardous situation for both the cars attempting to enter the roadway and the cars approaching. Driving on an overcrowded highway, no matter how picturesque, cannot be a restful experience since one must devote considerable attention to other cars and not to the landscape. To fully enjoy driving the parkway today one must pick a quiet time, if such times can be found.

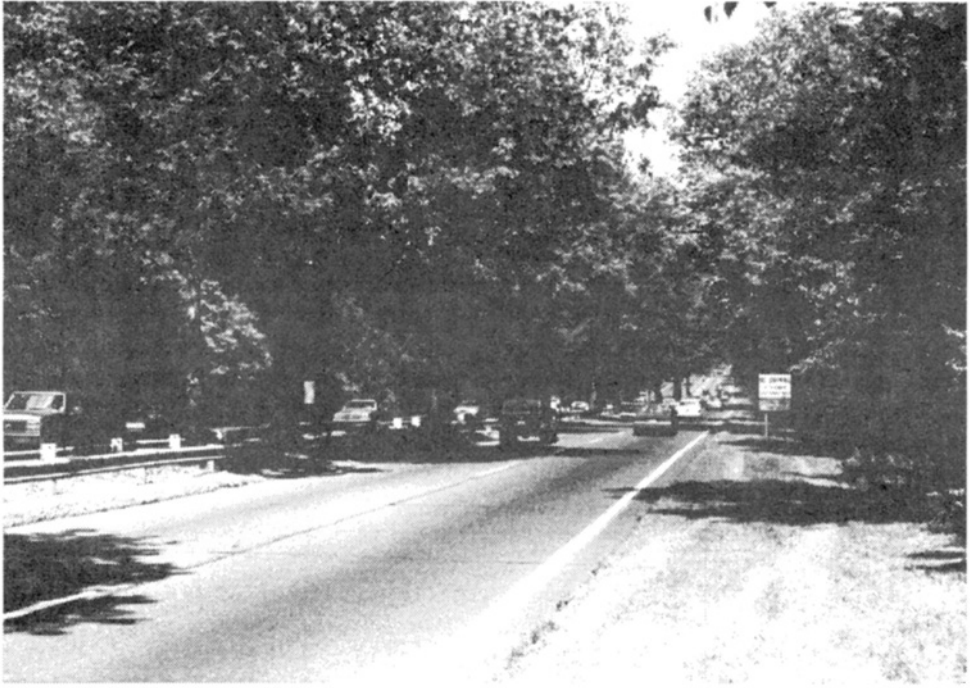


Figure 6. Heavy traffic on the Merritt Parkway today. Compare landscaping with Figure 5.

Modernization of entry lanes to the parkway at particularly dangerous locations is an option that warrants investigation at this stage. Unfortunately, construction would inevitably eat up some of the right-of-way, which, with its dense plantings, contributes so much to the parkway's character. A simpler solution, although one not likely to be very popular with commuters, would be to lower the speed limit to the original limit of 50 miles per hour, or even to 45 miles per hour. This recommendation may seem outrageous for a high-speed road, but it might make travel safer and more enjoyable. A lower speed would be easier for entering cars to attain, and it would also reduce stopping distances if a sudden stop were required. The slower speed limit might also encourage "speed demons" to utilize alternate routes (e.g., I-95) and leave the parkway to those more interested in a leisurely pace. But in truth, this remedy may be little more than

wishful thinking on the author's part.

CONCLUSION

The Merritt Parkway was one of the first modern, high-speed, limited-access roads in America. When completed in 1940 it provided 37 miles of some of the most pleasant motoring in the country, and it halved the travelling time between New York and New Haven. Safe travel at 50 miles per hour (raised to 55 miles per hour in 1947) was possible when the speed limit on other state highways was 40 miles per hour. The Merritt demonstrated that the essential features of the parkway concept could be applied to a high-speed highway. Therefore it should be considered a significant step in the evolution of the modern parkway.

For better or, perhaps, worse, the Merritt shifted the emphasis of parkway to "way"

and away from "park." The original idea of parkway was a park containing a roadway. The Merritt was, from its inception, a road within a landscaped area; it was first and foremost a conduit for passenger cars.

Parkways today comprise two main groups. The first is the recreational type, such as the incomparable Blue Ridge Parkway, and the Westchester County parkways before it, emphasizing travel at a leisurely pace chiefly for the experience of landscape. The second group consists of

high-speed roads connecting destination points yet simultaneously providing enjoyable and involving views en route. All parkways like the Garden State, which belong in this second category, can be traced in origin to Connecticut's Merritt Parkway. Although recreational parkways provide incomparable landscape experiences, the Merritt Parkway and other high-speed parkways provide a nation in perpetual motion a more attainable model for general highway construction.

REFERENCES

- Condit, C. W., 1961. *American Building Art*. New York: Oxford University Press.
- Larned, A. L., 1988. Personal communication.
- Monagan, C., 1977. "Queen of the Parkways." *Connecticut*, Fall, 33-37.
- Newton, N. T., 1971. *Design on the Land*. Cambridge, Mass.: The Belknap Press, Harvard University Press.
- Patton, P., 1986. *Open Road. A Celebration of the American Highway*. New York: Simon and Schuster.
- Robinson, J., 1971. *Highways and Our Environment*. New York: McGraw Hill.
- Tunnard, C., and B. Pushkarev, 1963. *Man-made America: Chaos or Control*. New Haven: Yale University Press.
- Westchester County Park Commission, 1924. *Report of the Westchester Country Park Commission*. Bronxville, New York.
- Wood, A. E., 1935. "The Merritt Parkway History and Plan." *Connecticut State Journal*, 2:32-35.

Parkways and Expressways of Japan

Yasuo Bansho, Tokyo, Japan

At the last of these international conferences on parkways in 1987, I stated that there were no parkways in Japan. A subsequent survey, however, has revealed that there are almost as many parkways in Japan as in the United States. One of these is the Yugawara Parkway, a 5.8-kilometer, privately administered toll highway. Japan has an additional eight highways called "parkways" and another twenty-six named "skylines."

These are all toll roads, and they all pass through scenic countryside areas, but they are not all parkways in the true sense of that word. In most cases, these highways have merely been given an American-sounding name in order to attract more motorists.

However, some of these highways have been constructed with the true American-type parkway in mind. Before examining these further, I would like to trace the history of Japanese national parks.

Japanese national parks are clearly modeled after U.S. national parks. In the 1920s, Japan's Ministry of the Interior studied the national parks of the United States. Following this, in 1931, Japan established the National Parks Law. Eight national parks were created as a result of this legislation. A few years later, the Pacific War broke out. After it ended in 1945, Japan was occupied by the Allied Forces. The General Headquarters of the Allied Powers issued a directive for the protection of Japan's national parks, and put Captain Pobam, formerly of the U.S. National Park Service, in charge. This step marked the beginning of a new stage in Japan's national parks.

In 1949, C. A. Richie, also of the U.S. National Park Service, visited Japan to conduct field studies into proposed sites for new national parks. He presented the results of his studies to the Japanese government in

1950. It was in that same year that the Japanese engineer Ikenoue provided the first detailed explanation of the national parkway concept. As an engineer in the U.S. National Park Service, Ikenoue had the opportunity to observe the Blue Ridge Parkway firsthand, and he was thus able to convey accurately its characteristics to the Japanese authorities. Thereafter, Ikenoue played a central role in the effort to bring about the development of parkways in Japan.

When Aso National Park was created in September 1953, it became the first national park in Japan to include a parkway bordered by a 100-meter-wide strip of land on both sides. It was named the Yamanami Highway and ran for 57 kilometers through a kaleidoscope of landscapes including pastures, farm land, and forests. Unlike the more typical farm land of Japan, this stretch of highway offered extremely beautiful and remarkably unique scenic views.

Following this development, a long and narrow national park was created in 1955. This new park was situated along the edge of the mountains in the Izu Peninsula and extended to the Fuji-Hakone National Park. Called the Izu Skyline, it offered picturesque views, including Mt. Fuji and Sagami Bay on Pacific Ocean.

Other long, narrow national parks were created between that time and the mid-1960s. However, these two routes are the clearest examples of attempts to create model parkways.

In the 1970s, as a result of the increasing air pollution caused by automobiles, as well as the destruction of the environment that came to be associated with road construction, highways began to receive bad publicity. For this reason, the concept of incorporating parkways into the national parks system began to lose its appeal. Today, few people

are aware that the Izu Skyline and the Yamanami Highway are modeled on American parkways; they are simply considered typical toll roads.

It is interesting to consider exactly how a Japanese parkway differs from the national parkways that exist in the United States. To begin with, there were a relatively small number of automobiles in Japan in the 1950s, as motorization was still in its infancy. Even if driving for pleasure was known to some, this activity was confined largely to trips to and from major tourist attractions, and so there remained a strong impression that driving was primarily a means of getting to a destination.

Secondly, in those days the typical life-style in Japan differed markedly from that in the United States. Recreation, for example, characteristically implied group activities. This outlook recalled an earlier agricultural society in which recreation was limited to those occasions when the entire community could afford to take time off from planting or harvesting crops. As a result, family or individual recreational activities such as picnics, camping, or hiking were virtually unknown. Indeed, there are no camping areas situated alongside either the Yamanami Highway or the Izu Skyline.

However, with the rapid economic growth of the 1980s, changes in people's life-styles have begun to appear. The family structure and ways of enjoying recreation have changed. In particular, family-oriented outdoor recreation is becoming increasingly popular.

The third difference concerns the administration of the parkways themselves. In Japan, commercial parkway traffic is permitted, a toll is charged, and there is little control over the surrounding scenery. These features, however, result from Japan's physical and economic environment. In the 1950s, the emphasis on economic recovery after the war dictated that one of the functions of these parkways should be to serve as

routes for the distribution of material goods and resources. Also, the national parks system itself took on the characteristics of a regional parks system, and, although surrounding lands were designated as national park areas, for the most part this land was privately owned. For this reason, it was impossible to exercise perfect control over the surrounding landscape.

Unfortunately, for these reasons it can only be concluded that there are not true parkways—in the American sense—in Japan. I believe, however, that with today's major changes in society and people's life-styles, the necessary groundwork for the development of true parkways has been completed. Although a number of obstacles do exist, it is possible to make major improvements, particularly on those highways presently designated as national parks. In this way, I believe it is possible to breathe new life into the dream of creating the kind of parkways that were originally intended when these highways were first constructed in Japan.

The present and proposed domestic expressways provide the basis for developing a Japanese parkway system. In 1963, there were only 71 kilometers of expressway in Japan. Today that number has increased to approximately 50,000 kilometers, and plans have been made to expand to 140,000 kilometers as we approach the 21st century.

Originally, the main purpose of these expressways was to accommodate the rapidly increasing number of automobiles, which reflected the vigorous industrial activity of the 1950s. Today, an expanded expressway network is planned, largely for the purpose of stimulating the regional economies, thus contributing to the expansion of domestic demand. This plan is one of the measures being taken to deal with U.S.-Japan trade frictions. At the same time, the aim is to create highways that can be a source of enjoyment for both motorists and local residents. Since most of the proposed new expressways will be constructed in mountain

areas where there will be a low volume of traffic, an important question will be how to generate the revenue to help pay for their construction and maintenance. (This necessity is one of the factors which accounts for Japan's toll-road system.)

In order to increase the potential revenue, it is necessary to attract more traffic. One option would be to include parkways in the expressway system. Above all, with the emerging need for driving pleasure as a result of the development of motorization, a true parkway-oriented concept should be followed in building new expressways. A concrete example would be constructing

parkways as alternate routes connecting one interchange to another while passing through areas of scenic farm land. This design would attract more motorists to the expressways and simultaneously stimulate rural economies. Of course, prior to implementing such plans, surveys and feasibility studies should be carried out.

I am confident that skillfully combining expressways with parkways in this way could revitalize those rural areas that are currently suffering from depopulation. In conclusion, it is my belief that the parkway concept has much to offer as a guide to the future development of Japan's highway system.

HABS/HAER Inroads: Recent Documentation of Canal Corridors, Park Roadways, and Urban Landscape Plans

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INTRODUCTION

Linear parks and scenic byways may at first seem an unlikely subject for a federal agency devoted to recording historic buildings and engineering structures to address, but not so in the current historic-preservation climate, which generously encourages the identification of multifaceted cultural resources. Unlike past eras when disciplines such as architecture, landscape architecture, engineering, conservation, and recreation were addressed as isolated specialties, the consensus today appears to be that a multidisciplinary approach is far more valuable. As a division of the National Park Service (NPS) of the U.S. Department of the Interior, the Historic American Buildings Survey / Historic American Engineering Record (HABS/HAER) is well suited to documenting these resources.

HABS/HAER's longtime initiative has

been to establish the federal—and the highest—standards for recording historic buildings and structures. This codified and comprehensive documentation is threefold: existing-condition ink-on-Mylar measured drawings produced by architects; large-format (4" x 5" to 8" x 10" negatives) black-and-white photographic views; and inventories, written data pages, and overviews researched and written by historians. The documentation projects undertaken by HABS/HAER, which are wholly financed by other federal or private-sector sponsors, include all three features.

HABS is as historic in its own right as the buildings it catalogs. Founded in 1933 as part of Franklin Roosevelt's Works Project Administration, it was a Depression-era effort aimed at employing architects, draftsmen, and photographers. While the goal of relief was paramount, the program was also the first instance of the hitherto private field of

historic preservation gone public. That first year was a tremendous success, with thousands of sheets of drawings and photographs produced, so in 1934 HABS was established as a permanent program. A tripartite relationship was formalized among the NPS, the American Institute of Architects as professional consultants, and the Library of Congress, which houses and cares for the collection and oversees public access to the information. The role of HABS was assured with the ensuing Historic Sites Act of 1935, in which the NPS became the primary federal agency responsible for historic preservation. Now more than 56 years old, HABS is recognized as the oldest federal program devoted to this activity.

The Historic American Engineering Record was established in 1969 to complement HABS. HAER records, for study and preservation, technology that has been rendered obsolete by contemporary engineering and is in danger of demolition. Like HABS, HAER is a cooperative effort among its professional affiliate, the American Society of Civil Engineers, and the Library of Congress.

To date, HABS/HAER has documented more than 22,000 buildings and structures. The estimated 46,000 sheets of drawings, 130,000 photographs, and 71,000 pages of written data are, cumulatively, one of the most popular collections at the Library of Congress. Beyond the primary goal of architectural-history scholarship, HABS/HAER's priorities are to mitigate the loss of a doomed structure and to produce an "insurance" record that can be used for reconstruction in the case of catastrophic loss. In recent years, the focus has been refined even further to the documentation of nationally significant sites, including National Historic Landmarks, and sites managed by the NPS.

While these statistics may seem impressive, the records represent only about 25 percent of the 10,000 major historic

structures overseen by the National Park Service; more than 1,500 of an estimated 1,900 National Historic Landmarks remain unrecorded. One incentive for continued recording, sadly, is the fact that an estimated one-third of the sites recorded by HABS/HAER since its inception have disappeared.

Over the years, while HABS/HAER's purpose has remained stable, the division's approach to documentation has evolved in several ways. Foremost is the labor force itself. During the 1930s, professional architects and historians were employed to fulfill the division's goals. During the 1940s, this, like other nonwar-related endeavors, lapsed. When survey activities resumed in the 1950s, it was more cost effective to hire students. Yet with the NPS's Mission 66 (begun in 1956), park buildings were slated for rehabilitation to compensate for the neglect of the previous decade. As a result, the importance of HABS/HAER's documentation efforts was understood. Additional impetus came with the Historic Preservation Act of 1966 as amended, which requires federal agencies, or others using federal monies, first to assess the impact their work will have on historic sites, and then to record them to one of several levels of HABS/HAER documentation. Meanwhile, HABS/HAER began to recruit students of architecture, landscape architecture, history, and historic preservation to carry out its initiatives.

Each year, HABS/HAER hires temporary employees—undergraduate and graduate students, as well as some professionals and faculty—to conduct fieldwork and research in small groups, or teams, during twelve weeks in the summer. In 1989 the division oversaw 31 projects and the largest number of "summer hires" to date, 130; they were based across the country, from ship sites in Hawaii and New York City, to steelworks in Pennsylvania and Scotty's Castle in Death Valley, California.

In the last few years, however, the scope

and subject matter of HABS/HAER documentation has developed beyond the traditional structure-by-structure approach. Rather, it now seeks and encourages multiyear, thematic projects that incorporate fully researched and developed historical contexts and a full range of resources—from industrial/commercial to residential/rural structures and landscape architecture—as well as a tailored and quantifiable methodology. At the forefront of these broadened inroads is HABS/HAER's documentation of two heritage corridors founded along nineteenth-century canal routes, roads and bridges in National Parks, and eighteenth- and nineteenth-century urban landscape planning.

CANAL ROUTES

HABS/HAER undertook documentation of the Illinois & Michigan Canal, a designated National Heritage Corridor, from 1985 to 1988. The investigation focused on the towns, cities, and industrial engineering works located along the 96-mile waterway whose "ragged bluffs, gentle slopes . . . and dashing streams . . . render this one of the most delightful locations . . . on the whole route from Chicago to St. Louis," according to a contemporary traveler. This was foremost a survey and inventory, whereby large teams of historians and architectural historians cataloged, researched, photographed, and otherwise recorded sites that developed after 1848 when the canal opened. The waterway ceased to operate relatively late, in 1933, when parts of it became a state park. In 1984 a bill was signed "to retain, enhance, and interpret . . . the cultural, historic, natural, recreational, and economic resources of the corridor."

During the three years of the project, the historic central business districts of ten towns were inventoried. Data were logged on commercial, public, and religious buildings; on industrial and engineering sites

associated with the canal, as well as its own apparatus; and on rural Utica Township, selected as representative of the area's agricultural heritage. All of the estimated 5,000 sites flourished during the nineteenth-century heyday of the canal, prior to railway's domination. No buildings erected after 1940 were included in the survey (respecting the 50-year definition of "historic").

The concentration of mid to late nineteenth-century buildings ranges from the 1870s Italianate Reddick Mansion to a 1920s Monticello-inspired Marathon filling station and includes many turn-of-the-century commercial blocks in downtown LaSalle and Peru. A variety of resources relate directly to the canal locks and apparatus themselves, including a locktender's house at Aux Sable and a mule barn in Ottawa—both constructed of dressed stone. The rural segment is best represented by the dwelling and outbuildings of the circa 1911 G. A. Bennet farm. Civilian Conservation Corps (CCC)-built structures such as trail shelters date from the 1930s, when the area served as a park.

On the HAER side, documented sites include industrial complexes such as the Norton & Company flour mills; a Quaker Oats grain elevator alongside the railroad track at Morris; the stone Gaylord Building, an 1830s dry goods store and 1860s warehouse; numerous passenger and freight railroad depots; and a variety of railroad bridges. HAER measured drawings were completed on five structures, including the unusual Ottawa Silica Company complex, built 1917-29. Not only was its current condition recorded, but the "process" drawings of sand sifting and sorting preserve the technology of this rare and outmoded technique.

Using traditional local history research materials, which include city directories, county and commemorative volumes, and newspapers, the development of each locality was charted along several themes. The result is more than a mere catalog of individual

structures; it includes contextual essays that explain local settlement patterns, the rise of industries, commercial and retail growth, and religious and ethnic patterns. Documentation of the Illinois & Michigan Canal was the largest single HABS/HAER recording project until the ongoing work in Pennsylvania that began in 1988.

In Pennsylvania, where only two towns affiliated with the Pennsylvania Canal were studied, HABS historians took a less quantitative, though no less comprehensive, approach. Investigation of the towns of Saltsburg and Alexandria in the summer of 1988 was part of a larger documentation project sponsored by the America's Industrial Heritage Project (AIHP), also an agency of the National Park Service, and by the Southwestern Pennsylvania Heritage Preservation Commission.

AIHP, encompassing nine counties in the southwestern part of the state, has two aims: to commemorate the region's iron and steel, coal, and transportation industries, and to interweave associated historic and cultural resources as a focal point for tourism and economic development. The commission formed to oversee development of the area is authorized to designate the Southwestern Pennsylvania Industrial Heritage Route, made up of four state roads that link historic, cultural, and scenic sites. Basing its decision on a reconnaissance study of the region's roads and sites, Congress in 1987 recognized the area as one of the "few recognized historic sites devoted to portraying the development and growth of heavy industry and the industrial labor movement in America." AIHP's financial commitment to HABS/HAER work has risen from \$60,000 in the first year to \$335,000 for fiscal year 1990. During the summer of 1989, nineteen historians and architects worked on AIHP projects in Pittsburgh, Johnstown, and Altoona, among other cities, recording residential neighborhoods, coal company sites, the Cambria Company ironworks, East

Broad Top Railroad shops, and glass, coal, and coke facilities. A field office in Johnstown continues to be staffed by four year-round historians.

One aspect of the area's industrial and transportation history is the 395-mile Pennsylvania Canal (Figure 1), which opened in 1829 between Philadelphia and Pittsburgh, establishing for the first time a viable trade and transportation route westward past the Alleghenies. The system was particularly noteworthy for its components: the Western, Juniata, and Eastern canal divisions; the Columbia-Philadelphia Railroad; and the Allegheny Portage Railroad, with its innovative inclined planes that conducted cargo across the mountains.

Because they have remained largely unchanged since the early twentieth century, Alexandria, on the Juniata River, and Saltsburg, on the Conemaugh River, were selected as representative of the dozens of towns that prospered and matured after construction of the canal and railroad. (Unlike the Illinois & Michigan Canal, however, the waterway was filled in to accommodate the railroad; the only evidence of it, in Alexandria for instance, is a flat, grassy swath across the town grid.) Twenty-two buildings in each town were identified and researched, then recorded in large-format photographs. Resources include such buildings as St. Matthew's Catholic Church of 1847, the 1851 Saltsburg Academy, the 1875 First National Bank of Saltsburg, and the circa 1880s Victorian hardware store of R. J. Taylor. The large number of residences include the Stewart House (later the Canal Inn) of about 1804, the circa 1816 John Cresswell House (made of stone), and the 1850s Connor House (notable for horizontal weatherboard and vertical board-and-batten siding). Most buildings were erected between 1830 and 1900 and reflect vernacular forms, with a sprinkling of the high-style Classical influences that moved west with the canal traffic.

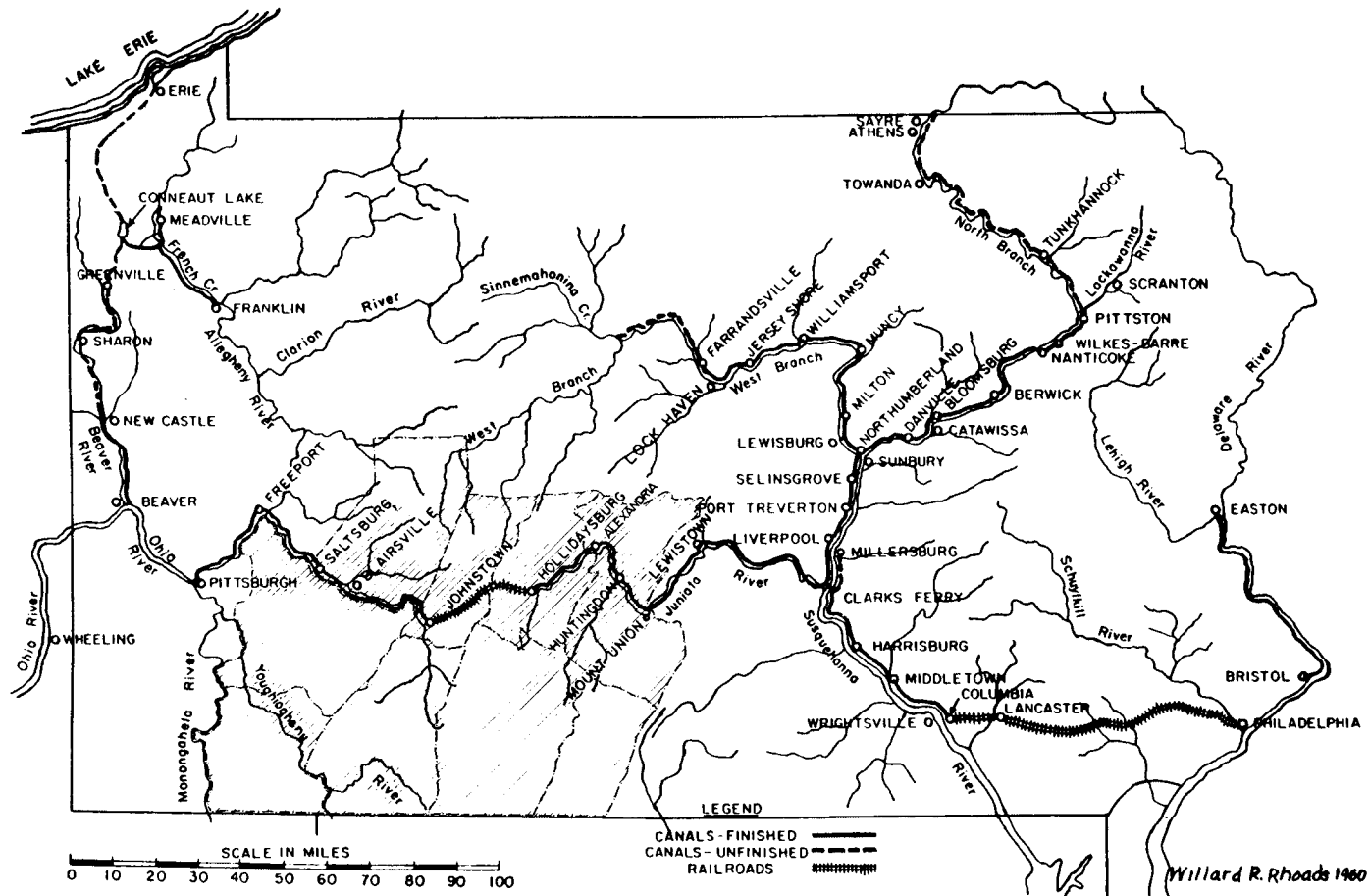


Figure 1. Map of Pennsylvania showing the Main Line Canal connecting Philadelphia and Pittsburgh, and the nine-county America's Industrial Heritage Project.

As important as the HABS building reports are, interpretation of the data relies upon the accompanying historical overviews of canal development in general and of local history. HABS has subsequently recommended that the two towns be nominated for listing in the National Register of Historic Places, and a comprehensive document containing findings and photographs has been published.

PARK ROAD SYSTEMS AND STRUCTURES

In recent years, HAER has initiated the systematic recording of bridges and other structures associated with park roads. Of approximately 3,300 bridges throughout the national parks system, about 10 percent were evaluated as eligible for the National Register. From this beginning, a pilot project was completed in 1988 in the Washington, D.C., area—encompassing the NPS's National Capital Region, the Colonial Parkway at Yorktown, Virginia, and the Chesapeake & Ohio Canal in Maryland and D.C. A selection of 43 bridges was photographed and standard data compiled for each. The criteria for inclusion were primarily an age of 50 years or older, design by a significant builder, and/or distinguishing construction features. The selection includes the Monocacy Aqueduct, a nineteenth-century arched span that carried the C&O Canal (also documented by HABS as early as 1936); a 1930s wood-truss bridge erected by the CCC south of the capital in what is now Prince William Forest Park; and the early twentieth-century Inlet Bridge at Potomac Park on the river.

This documentation project was the first endeavor to record to HAER standards all National Register-eligible bridges in the national parks system. The next step, on a grander scale, is a long-range documentation project begun in the summer of 1989. It is sponsored by the NPS's Park Roads and

Bridges Program, Engineering and Safety Services Division, which last year began a twenty-year reconstruction program at Yellowstone National Park. Besides the reconstruction slated, an added impetus to starting with Yellowstone was its imminent nomination to the National Register. HAER's documentation resulted in twenty sheets of drawings and large-format photographs for seven bridges in Yellowstone National Park. An example of this type of documentation is Figure 2, which shows the Crawfish Creek Bridge, a concrete barrel arch with masonry facing, completed in 1936.

In the summer of 1990, HAER is slated to document eighteen structures associated with Glacier National Park's Going-to-the-Sun Road, the fifty-mile roadway built in 1932 with a dramatic hairpin turn, from which travelers are treated to incomparable park vistas and sheer drops. Not only the bridges, but also the revetments, culverts, and retaining walls will be drawn and photographed. The road, already recognized as a technical and scenic wonder, will be nominated as a National Historic Landmark. Increasingly more HABS/HAER documentation projects may culminate with such written nominations, in keeping with the division's attention to the most historically significant U.S. buildings and structures.

URBAN LANDSCAPE DESIGN

In the gap between comprehensive heritage corridors and individually significant sites is a new HABS/HAER direction: the documentation of urban landscape design. The precursor to this trend is exemplified by HABS's 1987 documentation of Merchant and Nuuanu Streets in Honolulu. These two, the oldest designated streets in the Hawaiian capital city, developed around the turn of the century and are largely intact. The project was carried out as a facade study, recording graphically 13 low-rise commercial buildings that boast Classical-

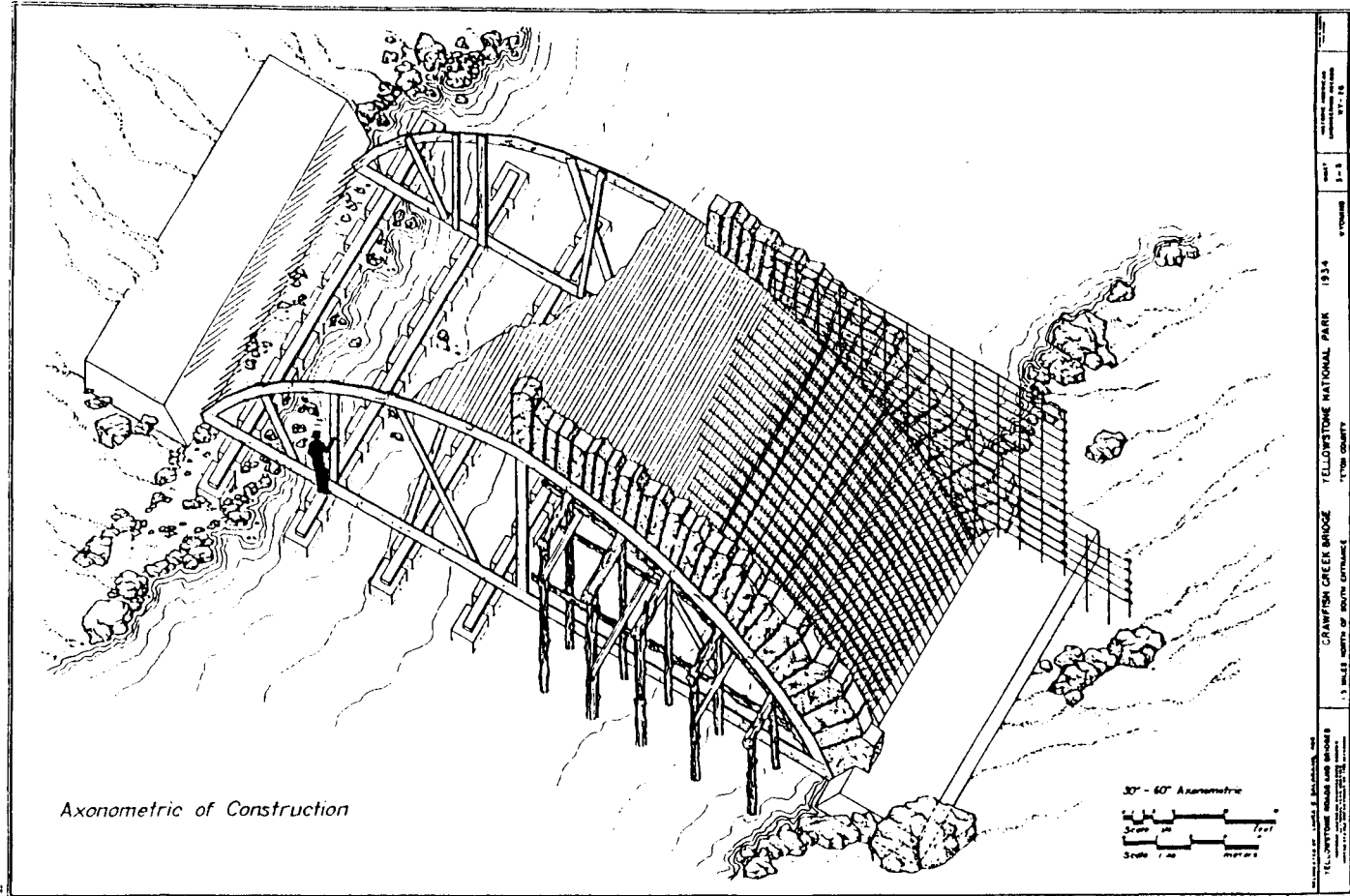


Figure 2. HAER axonometric drawing of Crawfish Creek Bridge, 1936, Yellowstone National Park.
Delineated by Laura E. Salarano

Romanesque-, and Spanish Colonial-Revival themes. Traditional elevation and site delineations permit design comparisons unattainable through the human eye or photographs.

In 1990, HABS is scheduled to embark on two related documentation projects that will commence where facade studies leave off. In Richmond, Virginia, HABS is planning to record Monument Avenue, an elegant nineteenth-century urban parkway whose flanking buildings are almost exclusively residential and, with one exception, unmarred by architectural intrusions (i.e., grossly altered or incompatible constructions). The 130-foot-wide, fourteen-block boulevard is formally articulated by four rows of trees, decorative pavers, and five primary circles boasting monumental statuary including several unparalleled Civil War memorials. One of the most impressive aspects of the avenue is the preserved quality of the context and unified spirit of the dwellings, all built from 1890 to 1920, and representative of a range of high-style to modest revival styles.

The documentation of such a designed landscape is likely to combine an inventory of each building, structure, and feature in the existing historic district. This approach includes large-format photographs of buildings and sculpture alike, and measured drawings of the statuary bases and the most significant dwellings. The narrative component will highlight the context of Richmond during the turn-of-the-century City Beautiful movement and include essays on the architects responsible for all aspects of the scheme. The strict linear nature of the property also renders it a prime candidate for experimentation with documentary techniques such as photogrammetric delineations of whole blocks.

Meanwhile, one of HABS's most challenging new projects is scheduled to get underway in Washington, D.C., in 1989-90. It is the documentation of the urban plan of the capital by French engineer Pierre

L'Enfant, and its evolution through early twentieth-century modifications by the McMillan Commission and others. Today, this complex overlay of a grid and criss-crossing avenues is the only extant example of Baroque eighteenth-century urban design in the country. The project will entail a comprehensive history of the 1791 plan, with its wide, tree-lined avenues and array of neighborhood parks or "reservations." A new approach will be HABS's assessment of the less-tangible attributes of the L'Enfant scheme, such as vistas as a deliberate design intention, while the facades along the way will take an ancillary role.

In a cooperative effort among the city and national and regional NPS authorities, the culmination of the L'Enfant plan history, delineations, and photographs will serve NPS management needs and become the basis for a National Historic Landmark nomination, perhaps in time for the bicentennial celebration of its design. Planning and political hurdles aside, the methodology used to assess and document the historic plan will help establish HABS standards for recording an urban landscape, ironically *exclusive* of all buildings except the symbolic two that L'Enfant specifically names, the President's House and the U.S. Capitol.

The variety and complexity of these cultural resources pose a challenge to HABS/HAER, which for more than a half-century has served as the arbiter of architectural and engineering documentary standards. As new cultural resources such as heritage corridors, parkways, and urban designs are recognized, new guidelines must be established to preserve them. To this end, HABS/HAER of late is refocusing on the most significant sites in the nation. Many are in the national parks system, and many are worthy of several years' attention. Today, ink-on-Mylar drawings and large-format black-and-white photographs cannot technically be superseded when it comes to providing permanent visual records of historic structures.

Nonetheless, HABS/HAER is also exploring state-of-the-art recording techniques, such as photogrammetry and Computer-Aided Design and Drafting (CADD), which lend themselves to the comprehensive analysis of some sites. In the area of research, historians are taking new tacks toward architectural scholarship, from attention to

long-ignored vernacular housing to the compilation of data bases that contain hundreds of sites linked by a common historical theme. Whatever the construction, the objective remains to document and to introduce to a larger public a greater volume of information about our architectural heritage than ever before.

The Hudson River and America's Love of Natural Landscape Scenery

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Americans have not always regarded natural landscape scenery as beautiful.¹ During our country's first two hundred years, there was a general contempt and abhorrence for the unsettled areas, or "back country." Gradually this attitude began to change toward a fascination with wilderness and natural scenery and a passion for preserving it in its unspoiled condition. By the mid-1820s, Americans had grown to love the American landscape and were extolling the virtues of rural life and country living. When the axe and plow had transformed this primeval wilderness into some semblance of a civilization, Americans became nostalgic and began to celebrate, in literature and painting, the charm and wonder of "Dame Nature" (Schuyler, pp. 26-27). This "cult of nature," as it has sometimes been called, led to the popularity of "suburbs" beginning at the turn of the nineteenth century. It also initiated the movement leading to the creation of planned romantic residential communities, to tourism within the wilderness areas of the eastern United States, to the development of the first "rural cemeteries," and to the inauguration of our first urban "country" parks.

Why did early Americans so dislike the New World environment? What factors contributed to this about-face in our thinking,

and where did it begin? The venue of our change of heart was the older, more settled portion of the country in the vicinity of New York City. Our most important waterway, the Hudson River, figured prominently in this movement. This paper will deal with the early American attitudes about nature; the evolution in our thinking and the factors, such as the paintings of the Hudson River School and romantic literature, that influenced the changes; the corresponding changes that came about in our living relationship with the rural landscape; and the role that early landscape architects played in facilitating Americans' admiration for nature and landscape scenery.

COLONIAL ATTITUDES TOWARD NATURE

The colonists who settled in New England following 1620 were religious dissenters bent on peopling the New World and spreading the Gospel. Upon leaving England, these Puritans envisioned America not as a wilderness but as a new Canaan—"the Good Land." It was as if they were to emerge out of the "unholy wilderness" of England and enter into Eden where they could freely practice their religion. It must be remembered that England was nearly devoid of any

semblance of wilderness or untamed land. After 2000 years of habitation, there was scarcely anything left that could be called a forest.

Immediately after their arrival here, the Puritans experienced "unexpected troubles and difficulties" (Reynolds, pp. 60-62). The "promised land" provided a disagreeable climate, food and water shortages, droughts, wild beasts, Indians, and epidemics. Their experiences molded their thinking. In a decade, the colonists' attitude toward the landscape had shifted to contempt for a land which was "... wilde and overgrowne with woods" (Heimert, p. 362). Forbidden by their moral tenets from engaging in any frivolity, they were prohibited from leisure outdoor activities or hunting for pleasure and were therefore divorced from casual contacts with nature, which might have nurtured an admiration for their surroundings.

The Puritans at Plymouth held to the belief that the "garden" they sought was just beyond the edge of the untamed "thicke Woode." Conquering the wilderness was a moral issue upon which their salvation depended. Splinter groups departed from Cape Cod into the Connecticut and Hudson River valleys. One such pilgrim remarked that "if you would know the garden . . . then you must glance your eye upon the Hudson's river." In 1680, William Hubbard regarded it as "the fertile and desirable tract of land in all the southerly part of New England" (Huth, p. 7). Despite the praises heaped on the region as an agrarian paradise, pre-Revolutionary accounts are silent on the matter of landscape aesthetics.

New England Puritans were not unique in their ambivalence toward nature. The Biblical wilderness was where man yielded to temptations. During the Middle Ages *wylde ness* was dreaded as the *nest* or lair of wild beasts—where one became *be-wildered* and fell into a life of sin. Little Red Riding Hood, lured off her route to grandmother's house by the pretty wildflowers,

fell prey to the big bad wolf (Stilgoe, pp. 7-10). Early accounts of travel in Britain are almost devoid of descriptions of scenery. Evidence of human triumphs over nature were recorded in glowing prose but uncultivated places were referred to with scorn or indifference. As England, the mother culture, had damned mountains and wilderness, so did the colonists.

The seventeenth-century Puritans' feelings about nature were mingled with the lore of the Dutch settlers of the Hudson River valley. They too did not consider nature to be a friendly backdrop. Unlike the English religious pilgrims, whose definition of wilderness was reshaped here, the Dutch landed in New Amsterdam with a centuries-old hostility toward both forests and mountainous landscapes. Medieval superstitions abounded in their folklore. Holland was flat and nearly devoid of woodland areas. Thus the unfamiliar environments which they encountered in North America were charged with "... awful presences and powers."

As revealing of the long-standing regional lore as any references to be found were the writings by a nineteenth-century citizen of the middle Hudson, Washington Irving, America's first internationally acclaimed author. In 1819, his narrator of *Rip Van Winkle* told us that the mountains and valleys have "always been a region full of fable. The Indians considered them the abode of spirits . . . wreaking all kinds of evils . . . the boldest hunter would not pursue his game within its precincts . . ." (Irving, p. 61). In the Hudson Valley's *Sleepy Hollow*, we are told, "... some witching power holds a spell over the minds of the good people . . . The whole neighborhood abounds with local tales, haunted spots . . ." (Irving, p. 56). Irving was characterizing the widely held American feeling that nature was an unwelcome presence that we might best avoid. His eerie tales also indicate the general absence of an aesthetic consciousness, of

attention to the pleasure to be derived from looking at natural scenery. These were not to come about on a large scale until the following decade.

In Europe, by the middle of the eighteenth century, there began to be a gradual shift toward a less hostile view of nature. When Jean-Jacques Rousseau took refuge from ideological persecution on an island in an Alpine lake, he found himself to be at one with nature. He thought that by living in harmony with nature man could achieve spiritual nourishment. The "noble savage," such as James Fenimore Cooper's "Last of the Mohicans," soon came to symbolize the romantic notion of "Natural Man." Nature came to be considered both innocent and beautiful (O'Brien, p. 70, n. 15).

Rousseau's views initiated the romantic movement with its emphasis on emotion rather than reason. Soon this outlook was being expressed by writers such as Wordsworth, Blake, and Goethe, by musicians such as Mozart and Beethoven, and by the painters Constable, Turner, Corot, and others. There was, however, a heavy moral overtone to much of their work. Much of the European painting of the late eighteenth century was also moralistic in tone.

PAINTING AND AMERICA'S ATTITUDE TOWARD NATURE

The role that pictures—paintings, lithographic prints or engravings—played in shaping the collective image of the country cannot be over-estimated. A picture can be the starting point of an attitude. Not only can a picture convey an image of a place unknown, we can also be predisposed to like or dislike a place we have never visited due to images of it we may see prior to physically being there (Sontag, p. 162).

Prior to about 1820, the graphic arts also treated nature and landscape with indifference or, at least, without an eye

toward aesthetics. Painting was confined almost exclusively to portraiture, with landscape "entourage" tucked off to the edges. Many early American watercolors were produced by English "view painters" touring this country. Their work, as well as that done by many local painters, frequently incorporated whimsical—but emotionless—backdrops of imaginary English or European garden scenes. More typical were the cold-feeling woodcuts and engravings produced for travel books or for military reconnaissance maps and the topographical views of private estates such as those often found along major waterways—the Hudson, Schuylkill, and Potomac. For all their apparent accuracy of detail, "bird's eye views," usually of major cities, evidenced practically no feeling for landscape aesthetics.

It was typical for the late eighteenth- and early nineteenth-century American aspirants to go abroad to hone their skills. In this country there were few major paintings that they could study and learn from. They went to the painting capitals—London and Paris—to avail themselves of the works by the great masters. In the salons and museums they confronted the landscapes of the seventeenth-century French landscapists or *limners*, Claude Lorrain, Nicolas Poussin, and Salvator Rosa as well as their English successors, Constable and Turner. In England and France, such Yankees as Benjamin West, John Trumbull, and Washington Allston were shaped by the romantic way of seeing and painting.

The young Americans were inspired to paint "compositions" rather than real scenes from nature. Their spiritual mentors had juxtaposed Biblical or allegorical characters in rural Italian scenery that was articulated with classical structures, many of which were in a state of decay or ruin. Such paintings glorified nature while at the same time glorifying God and the Ancients. The English masters, in emulating the earlier French, retained the emphasis on the

landscape—the English countryside—but tended to animate their pictures with livestock and rural peasants rather than historical subjects. Instead of classical temples, intact or collapsed, they articulated the landscape with rustic cottages, medieval castles and Gothic structures. These elements contributed to the “sublime” manner of the pictures, characterized by vivid irregularity of form and texture, with sharp contrasts of strong light and dark shadows and by feelings of obscurity, vastness, terror, pain, and transcendent forces of destruction (Wilmerding, p. 83).

Emotional attachment to objects that are old, or look old, is an ancient human trait. David Lowenthal suggested that nature induces all man’s works to “come back to her arms—rust, lichen, moss, the cracking . . . of mortar joints . . . and brick itself—Nature never lets up” (Lowenthal, 1976, p. 57). Yet as a very young nation, America had few equivalents of European ruins. Perhaps that is the major reason that ruins held such a grip on the imagination of Americans, particularly our painters. Instead of “imported images from another culture” (Shepard, 1963, p. 8), what we have are mountains. And because these huge, rugged, and weathered landforms had, for so many generations, aroused such emotional and eerie feelings in the American imagination, they were a readily available American landscape equivalent to the sublime elements employed by the English landscape painters.

Our nation was also endowed with the other favorite subject of the painters and tales of horror—deep, dark forests. James Fenimore Cooper once referred to our forests as “dark Rembrandt-looking,” providing scenes that “Rosa would have delighted to draw” (Miller, p. 150). The remaining major natural element is, of course, water. What more vital commodity to life itself and to the “life” of a landscape composition—be it real or painted—is there than water? America has water in abundance so it became the

focal feature of many early nature paintings.

After the Revolution, Americans looked less to Europe for their cultural and intellectual leadership. By the nineteenth century, Americans had become nationalistic. We acquired feelings for those things which were uniquely American, and what more distinguished this nation from all others than the landscape itself? As we developed an increased sense of national pride, the landscape acquired patriotic value and became a subject for artists. But instead of portraying the landscape as contrived scenery through which some ancient literary message could be conveyed, a new generation of painters emerged who were intent on glorifying the new nation. At the same time, the eastern wilderness areas were rapidly disappearing due to urbanization, agriculture, and logging. We could, for the first time in our occupation of the continent, see more cleared, inhabited land than undisturbed land in the more populous sections. It was at that point, when nature was first perceived as threatened by people, that we became sentimental and began to reminisce about its endangered beauty (Shepard, 1953, p. 7).

One of America’s greatest sources of national pride was the newly constructed Erie Canal. It was the single greatest nonmilitary accomplishment in the history of the country when opened in 1825. The 360-mile “big ditch” from Buffalo to Albany linked the Great Lakes, via the Hudson River, to the Atlantic seaboard, enabling untapped resources from the Northwest Territory to be shipped to the mouth of the Hudson River at New York City and from there, to be exported all over the world.

The Erie Canal was conceived in 1816 by New York’s mayor, DeWitt Clinton. That same year he took over as president of the American Academy of Fine Arts and organized a major exhibition of paintings by America’s three leading painters, Colonel John Trumbull, Benjamin West, and Gilbert Stuart. That event has been regarded as

"one of the first events heralding the new wave of cultural nationalism after the War of 1812" (Miller, pp. 95-96). In his opening address, Clinton expressed many of the same sentiments which our foremost writers, Irving, Cooper, and Bryant, and many of our landscape painters were soon to express. He stated that the artist's imagination "must derive its forms . . . from the country in which he was born. . . . Can there be a country in the world better calculated than ours to exercise and exalt the imagination? . . . Here nature has conducted her operations on a magnificent scale . . . this wild, romantic scenery" (Clark, E., p. 8).

A single event in New York City changed the course of American painting history and, in turn, feelings about nature and the landscape. Prior to the mid-1820s there was no market in America for paintings of the "dreaded wilderness." Presumably no one cared to look at pictures of the "uncouth state" of the inhabited countryside. In 1825, a Lancashire painter named Thomas Cole, who had come to this country in 1818, placed three landscape views of the Hudson River for sale in a small frame shop. They caught the attention of John Trumbull, who bought one of them for twenty-four dollars. Within months of his first sale, Cole's three paintings were purchased by Philip Hone, the mayor of the city—and its most important art collector.

The acclaim Cole received brought commissions to enable him to establish his home and studio on a site directly overlooking the Hudson River and Catskill Mountains in the town of Catskill, New York. From there he traipsed around the wilderness, sketching studies from nature. He would then return to his studio, where he synthesized more idealized landscapes in oil on large canvases. In a letter, written in 1826, Cole described his technique: "[T]he most lovely and perfect parts of Nature may be brought together, and combined in a whole that shall surpass in beauty and effect any picture painted

from a single view . . . without the objections."² Cole was the first to expressively interpret the American wilderness as a theme (Merritt, p. 6). It was Thomas Cole, the Englishman, who sensitized our American eyes, ". . . and greatly enhanced our incipient love of our own scenery . . . the austere loveliness of our . . . Eastern Mountains . . . and forests . . ." (Mather, pp. 299-300).

It was thus that the Hudson River School of painting began—the first truly American movement in painting. Within a decade, the demand for paintings that portrayed the American wilderness had flourished, prompting many aspiring painters to set out traveling the environs of the Hudson to record its beauty. It was upon Cole's advice that they did on-site drawings from nature (Cole, pp. 1-12). About the same time travel books illustrated with large detailed engravings, often copies of original oils, began to appear. William G. Wall's *Hudson River Portfolio* and Joshua Shaw's *Picturesque Views of American Scenery* are two of the earliest and best (Fitch, p. 181).

The role of patrons cannot be overstated. Luman Reed and Robert Gilmor, Jr., motivated by their own patriotism, typically dictated the themes they wished to have imbued in the works by the artists in their "stables." One such directive called for "gorgeous colors of the forest trees in autumn." Another patron urged the portrayal of "a true American landscape . . . a rich green valley just pictured after a shower in the soft repose of a summer sunset" (Miller, p. 156). The connoisseurs, more so than the artists, wanted fine detail and realism depicted in the canvases they commissioned.

The close working relationship between science and art that had developed by this time contributed to this situation. As the scientists began widening their search for knowledge about our world, it became increasingly important that they accurately document their findings. Lacking cameras, scientific illustrators became a vital com-

ponent in the scientific process. Artists were called upon to accompany researchers into the field to record in minute detail images of the physical discoveries in geology, botany, and zoology. In this way, science acquired a greater visual and aesthetic orientation while in the arts there was seen a growing attention to factual detail.

The exquisite detail shown in the Hudson River paintings was also motivated by religious morality. Patrons and painters believed moral excellence was akin to physical perfection, and so great detail was a measure of beauty.³ Also, God was thought to be manifested in natural scenery; if America had the most beautiful, sublime scenery in the world, then God must have favored this nation over others (Miller, p. 18). Thomas Cole's work had this religious quality and, through his pictures, he sought to reveal a higher order of creation.

The moralism associated with landscape paintings and, in turn, with nature itself can be gathered from the 1830 passage from the *Northern American Review* in which the writer asserted that the taste for beauty in nature and in art are "nearly allied to the love of good . . . it has often been doubted whether Beauty be anything more than a visible manifestation of those amiable moral qualities of which the mere idea fills the heart with delightful emotions. . . ." The writer further stated that landscape paintings "produce happy and civilizing influences upon society . . . cultivate a love of nature and of beauty, and surround life with charm of elegance and refinement (Novak, p. 62). In 1836, Ralph Waldo Emerson stated in his first book that "in Nature man would find his true emancipation . . ." (Davidson, p. 102). "America is a poem . . .," he wrote, "Beauty . . . will spring up between the feet of brave men. . . ."

While Cole also painted landscapes from elsewhere, he relied on the Hudson Valley and the nearby Catskill Mountains for most of his subject matter. From his home ninety

miles north of New York City, he could devote the summer months to wandering the landscape to sketch and prepare notations. The winter months were spent painting and conferring with patrons in New York. William Cullen Bryant was a close friend of Cole and at his funeral in 1848 delivered an oration that recalled their "many frequent rambles in the Catskills." A mutual friend and traveling companion, Asher Durand, was commissioned in 1849 to portray the two (*Kindred Spirits*) in one of their favorite Catskill Mountain settings (Davidson, p. 105). Durand succeeded Cole as the most prominent of the growing circle of Hudson River painters, which, by then, included Albert Bierstadt, John F. Kensett, Frederick E. Church, David Johnson, and scores of others.

THE HUDSON RIVER REGION

The Hudson region is closely associated with our nation's political past. As described by Bryant, "the whole neighborhood is among the most famous regions of our history. During the War of the Revolution, West Point was . . . one of the most important military posts in the country" (Bryant, 1874, vol. 2, pp. 13-14). The valley was the home and setting for the works of many of this nation's most important early writers. The setting of Cooper's *Leatherstockings* stories was along the Hudson as were many works by Bryant, Irving, and Nathaniel Parker Willis. John James Audubon, considered by many to be America's greatest ornithologist, was a native of the region as was Samuel F. B. Morse, the inventor and painter, and the landscape architect Andrew Jackson Downing.

The Hudson River extends from the New York City harbor to its headwaters 300 miles north in the Adirondack Mountains of upper New York State, near Lake Champlain. It is a tidal estuary for half its length, as far inland as Albany. Its middle section, known as the Highlands, is where the river is

bounded on both shores by mountains. The beginning point of this most picturesque portion of the valley is the "Highland Gate" and the town of Newburgh, which is 50 miles from New York City. Overlooking Newburgh Bay, "the most perfect of Hudson's harbors . . . an enchanted region," is Storm King Mountain and ". . . the dark pile of the Cro'-Nest," looming 200 feet straight above the water (Bryant, 1874, vol. 2, p. 7). Farther north, on the western bank, lie the Catskills, or Kaatersbergs, with elevations approaching 4000 feet.

Because of the dramatic rise of the land from directly beside the river's edges, the area, called a "water gap," was difficult to develop for agriculture or town settlement. It was, therefore, left largely unaltered. Such a water gap was almost unknown in Britain or Europe, with the exception of the Rhine. Water gaps are usually admired as scenery, and they have "evoked some of the most rapturous descriptions in travel literature" (Shepard, 1961, p. 5). Bryant called the Hudson "our most beautiful and perfect American river" (Bryant, 1874, p. 1).

It was in the Hudson region that nature tourism arose in America. In addition to the increasing popularity of the landscape paintings by the Hudson River School, other contributing factors were the increasing number of epidemic diseases, which plagued cities each summer, and the appeal that travel to the Great Lakes and Niagara Falls, via the Erie Canal, offered. The burgeoning railroad network on the east coast and the development of steam-powered "Dayliner" tour boats enabled further penetration of the hinterlands near population centers.

Walking for pleasure seems not to ever have had the appeal in America that it did in England. Contrary to rural England, the sheer scale, ruggedness of the Hudson terrain, and fears of actually becoming lost-or of having encounters with snakes and wild animals—discouraged Yankee recreational strolls. Instead, American tourists preferred

the ease and comfort of tour boats, canal barges, coaches, and excursion trains, all of which covered greater distances than possible on foot. In 1820, a French passenger on one of the Hudson River Dayliners noted that his American travel companions often "dropped their playing cards and rushed out on deck to marvel at certain views . . . as each traveler finds in them new reasons why he should love his country" (Creese, p. 46).

Beginning in the 1820s, many lavish resort establishments were created in the Hudson Valley, as well as in the Catskills and around Lake George, Lake Champlain, and other areas in New York State, to capitalize on the growing interest in the wilderness. Two notable examples were the Catskill Mountain House, "a palace built for the angels" 2212 feet above the Hudson, and the Cozzens's Hotel, which Bryant described as "perched high on the brow of the cliff that is the most prominent on the western shore for several miles. . . . Nothing could be more picturesque . . . so bold and rugged . . . several hundred feet above the water . . ." Bryant's admiration of Cozzens's suggests that the Old World still fascinated Americans. When looking up at the hotel from the river, he wrote, "one may deceive himself into the belief that he looks upon some legend-haunted ruin near the Rhine . . ." (Bryant, 1874, vol. 2, p. 14). Resort hotels were stopping-off points for the thousands of travelers who were partaking in the American "grand tour" which also included the spas and gambling casinos at Saratoga Springs and Niagara Falls. Artists of the Hudson River School—Cole, Durand, Church, and George Inness—found the resort pleasure palaces to be ideal subjects for their canvases. Their painted images were often copied and thus widely available as engravings and lithographs, such as those mass-produced by Currier and Ives. The region's remote man-made landmarks soon became widely recognized by Americans

from all sections of the country. Many guidebooks appeared at the same time to assist the new breed of backwoods Yankees in plotting their way from one resort to another.

THE HUDSON RIVER ESTATES

In 1609, the Dutch claimed the Hudson region and meted out land grants of vast size along the east bank of the river to *patroons* (patrons) to induce them to settle and develop the colony. Because the terrain was steep and because most of the landowners were not dependent upon agriculture, the majority of their property was maintained in a relatively unaltered state. Consequently, the grounds of the Dutch owners and subsequent Yankee gentry tended to be covered in dense trees, with the major exception being the vistas created in order to view the Hudson, the Catskills, or other surrounding landmarks. In contrast, the English landscape gardens that were created in Europe from the beginning of the eighteenth century were contrived compositions of cleared land, of which England had an excess, and planted woodlands rather than naturally occurring forests. It was not until the emergence of the Hudson River School of painting, and the increased interest in nature, that a significant movement toward rural living—and the subsequent experimentation with romantically landscaped country places—came about in America.

Until the early nineteenth century, roads were very few and of poor construction; therefore, navigable waterways were the chief transportation routes. Because of its great size, the Hudson was navigable by sail boats as far north as Albany. Each town along the river laid out its public facilities and streets in relation to the Hudson. Since the land around most communities ascended steeply, their major visual orientation was toward the water.

A strong identification with the Hudson

was also true for most private homes. Most were situated back from the shore and on elevations several hundred feet above the water level with a cleared swath between the house and the water. Thus, commanding views could be obtained. It was this exploitation of appropriated views, or “borrowed scenery,” that marked one of the greatest design distinctions between the American version of the naturalistic, or landscape garden, style and the British.⁴ Whereas in England, most of the landscaped estates were of immense size and required huge fortunes to create and maintain, Americans did not possess such capital. Therefore, reliance on the setting—the *genius loci* of one’s site—was maximized (Chase, p. 36). In many ways this design was an expression of a basic human desire to seek out the most secure—the least physically threatening—position and the place from which one can feel in greatest control over the environment. From the elevated, unimpeded vantage point that occurs adjacent to a cleared area, one obtains a prospect (Leveson, p. 86). As observable in most great built works, such a position of prominence has long symbolized power and authority.

Following the American Revolution, our urban population increased dramatically, and during the 1790s, yellow fever began to plague New York City. Many of those who could afford to purchased Hudson River property, on which they built refuges from the city during epidemics. These people were typically well educated and widely traveled (Reynolds, 1935, pp. 60-62). Their homes were the essence of refined taste in architecture, furnishings and, in the words of Andrew Jackson Downing, “There is no part of the Union where taste in Landscape Gardening is so far advanced, as on the middle portion of the Hudson” (Downing, 1847, pp. 152-153).

With this new-found appreciation for the beauty of natural scenery and the

pleasures derived through contact with nature, Americans, in increasing numbers, began to turn toward country living on the fringes between the cities and the country. The term "suburb" was first used in the 1840s in connection with the Hudson Valley by the writer Nathaniel Parker Willis. From his home in Cornwall, called *Idlewild*, he frequently commuted to New York City to confer with his fellow writers. After its invention in 1806, the steamboat made such travel possible as far upriver as Newburgh, sixty miles north of New York. By the 1820s, it was possible for people of the valley to maintain a permanent residence in a rural setting and visit the city for their shopping and cultural life (Creese, p. 46). Bryant found this situation ideal. "All over the Hudson's banks, from Newburgh to New York . . . people cluster in villages . . . gaining, in spite of themselves, from their surroundings" (Bryant, 1874, p. 22).

At the beginning of the suburban movement—the 1820s and 1830s—the maintenance and improvement of the grounds of most of the mansions along the Hudson was, according to Andrew Jackson Downing, "carried out under the direction of the proprietors themselves, suggested by their own good taste, in many instances improved by the study of European authors, or by personal inspection of the finest places abroad" (Downing, 1844, p. 29). The only American book on the subject of landscape gardening was the *American Gardener's Calendar*, written by Bernard M'Mahon in 1806. Only twelve pages were devoted to the subject of landscape garden design, but he emphasized the importance of exploiting the surrounding scenery as was being done along the Hudson: "[E]xtend the prospect into the adjacent fields and country . . . give these an air of larger extent than they really have . . . so that [they] appear to be . . . a continuation of the pleasure ground" (M'Mahon, pp. 62-72). Downing claimed that "[t]he only practitioner of the art, of

any note, was the late M. Andre Parmentier of Brooklyn, Long Island." He considered Parmentier's "labours and example[s] as having effected directly, far more landscape gardening in America, than those of any other individual" (Downing, 1844, pp. 29-30). Parmentier, a Belgian horticulturist, came to America in 1824 and established a nursery in Brooklyn. He is reputed to have worked on several estates in that region until his death in 1830. *Hyde Park*, ninety miles from New York, his only known example, was lauded by Downing as "one of the finest specimens of the modern style of Landscape Gardening in America" (Downing, 1844, p. 34).

In 1841, Downing, who lived his entire life in Newburgh, wrote *A Treatise On Landscape Gardening*, in which he described the character of the region most succinctly:

There is no part of the Union where the taste in Landscape Gardening is so far advanced, as on the middle portion of the Hudson. The natural scenery is of the finest character, and places but a mile or two apart often possess, from the constantly varying forms of the water, shores, and distant hills, widely different kinds of home landscape and distant view. Standing in the grounds of smooth lawn, the rich groups of trees shutting out all neighboring tracts, the lake-like expanse of water, and, closing the distance, a fine range of wooded mountain. A residence here of but a hundred acres, so fortunately are these disposed by nature, it seems to appropriate the whole scenery around, and to be a thousand in extent (Downing, 1844, pp. 33-34).

In the *Treatise*, the first of its kind published in America, Downing enumerated the design virtues of forty east-coast country residences which he regarded as exemplary of "tasteful gardening" at that time. Thirteen of his favorites bordered the Hudson. To Downing,

water was *de rigueur*. The presence of water—flowing stream, pond, lake, or sea view—were common to the forty examples cited in the *Treatise*. Downing's friend, Willis, felt the same about water and scenery: "It is in river scenery . . . that America excels all other lands: and here the artist's labour is not, as in Europe, to embellish and idealize the reality; he finds it difficult to come up to it" (Creese, p. 84).

In a speech given in 1848, Downing acknowledged that he was an "Associationist." Those who subscribed to this philosophy believed that mankind is in a constant state of "yearning for the lost garden." Therefore he regarded gardening "as being, next to religion, the great humanizer of the age." His dream was to put "men into daily contact with nature . . . in their country and cottage homes" (Downing, 1848). That ideal, he thought, if demonstrated by those who could best afford it in treating the grounds of their estates, would be spread to lesser private residences and even to the towns (Creese, p. 84).

PLANNED SUBURBAN RESIDENTIAL COMMUNITIES

Artists and intellectuals were acquiring a missionary zeal about enlightening the public to the virtues of nature and country living—so much so that in the 1850s they conceived America's first planned suburban communities. In 1850 Downing wrote an editorial on "country villages" in the *Horticulturist* (which he had founded in 1846) describing the ideal rural village, which had "a large open space, common, or park, situated in the middle of the village." Thus, the rural character of the community was established by a naturalistic park, which, he suggested, could be the setting for social interaction and should be covered in lawn and trees and comprise about fifty acres. The best cottages and residences were to be located nearest the park. He prescribed minimum lot sizes

and "space, views, circulation of air, and broad . . . avenues of shade trees." While Downing did not use the term "suburban," he spelled out the essential character of future planned suburban communities.

When N. P. Willis retired and left New York to live closer to nature, he wrote critiques of the city and extolled the qualities of rural life. At times, however, he grew tired of the very solitude that he had sought. He frequently invited friends to visit him at *Idlewild*. In 1851 he conceived the idea of developing a community of scholars, called *Highland Terrace*, to be located on a natural plateau one hundred and twenty feet above the Hudson between Newburgh and Cornwall (Creese, p. 45).

While *Highland Terrace* was never built, within the next few years another planned romantic residential community was conceived and partially constructed: *Llewellyn Park*. Within view of New York City, sits Orange Mountain surmounted by Eagle Rock—650 feet above sea level. This New Jersey landmark was purchased in 1852 by a wealthy New York pharmaceutical merchant named Llewellyn Haskell. There he was to develop *Llewellyn Park*, America's first idealistically planned suburban residential community. Haskell was an admirer of nature and a member of the Swedenborgian branch of the Perfectionist sect.⁵ Other like-minded notables were Irving, Bryant, Downing, and the architect Alexander Jackson Davis. Haskell's utopian plan reflected his philosophical belief that certain qualities in art and nature, by their association with other past experiences, induce emotional responses in persons exposed to either. This view led Haskell and his fellow believers to be anti-city. In 1853, Haskell hired Davis, who purchased a twenty-five-acre parcel adjacent to Haskell's, and there built his own picturesque house, *Wildmont*. Each had a commanding view of the Highlands, Manhattan, and the Atlantic. Davis "rusticated" Haskell's house by adding coarse

bark-covered timbers to its sides and erecting two pointed towers of rock and wood. Fifteen acres around Haskell's *Eyrie* were adapted to a landscape garden, while the remaining twenty-five acres were left untouched.

Believing that this setting would be an ideal situation for others of their kind, Haskell, with Davis's advice, began to purchase more land around them and to plan the layout of other private residential properties, roadways, and common open spaces. Eventually 350 acres were assembled (Davies, p. 143). Their plan, published in 1857, was laid out in the "modern natural style of landscape gardening" (Archer, p. 155). It was to retain as much of the natural character of the site as possible while providing gracefully winding carriageways, abutted by fifty "villa sites" ranging from five to ten acres in size. Other than private houses, the only structural elements introduced were several rustic seats in the fifty-acre common land known as the "Ramble," and the rocky gatehouse at the neighborhood's only entrance.

Llewellyn Park, as a utopia community, was not long lived. Soon after he began to market the sites, Haskell met with personal financial problems and turned the administration of the project over to individuals with less commitment to his original ideals. Nonbelievers began to outnumber the handful of "radicals," and thus the theosophical basis of the concept was undermined. Many latter-day structures were ostentatious contradictions of the wild setting.

EIGHTEENTH-CENTURY URBAN PARKS AS SURROGATE WILDERNESS AREAS

Throughout the 1840s Bryant, Downing, and others were writing about the importance of creating public parks for American cities. In the *Horticulturist*, Downing wrote:

by establishing refined public . . .

parks, and gardens . . . you would soften and humanize the rude, educate and enlighten the ignorant, and give continual enjoyment to the educated. Nothing tends to beat down those artificial barriers, that false pride . . . so much as a community of rational enjoyments. Make the public parks or pleasure grounds attractive by their lawns, fine trees, shady walks, and beautiful shrubs and flowers. . . . I see the public . . . places filled with all classes of society, partaking of the same pleasures (Downing, 1848, pp. 156-158).

Downing noted that after the invention of the rural cemetery, just a decade before, "these cemeteries are the only places in the country that can give an untraveled American any idea of the public parks and gardens abroad" (*Ibid.*). His dream of having urban public parks as "great wholesome breathing zones" within our cities began to be realized just a decade after his pleas were made.

Unfortunately, Downing did not live to see even the first, New York's *Central Park*, for it was not designed until 1856, by Frederick Law Olmsted and Calvert Vaux, and completed 20 years later. Within *Central Park*'s 850 acres, however, Downing's vision was fulfilled. In the park are also many of the elements of the sublime and qualities that the picturesque paintings of the Hudson River School had incorporated. The swampy and rocky site was transformed into countless water bodies and into bold statements in massive rock, such as many of the bridges and much of the architecture. The poor quality of the vegetation occurring on the site was overcome by transplanting thousands of trees, shrubs, and vines—so much so that in areas such as the *Ramble*, in the center of the park, one can conceivably become lost. Thus, within the city of New York, it is possible for an individual wishing to have contact with nature to have a brief "wilderness" experience—however make-believe.

CONCLUSION

The Hudson River figured tragically in the death of Andrew Jackson Downing. On the morning of July 28, 1852, Downing, his wife, and his mother-in-law boarded the *Henry Clay* for a trip to Newport. Several hours into their trip the boilers overheated and burst into flame. The pilot overreacted and swung the boat around, sending it crashing into the shore at full speed. Seventy passengers were thrown into the water and drowned. Downing, who was an expert swimmer, attempted to locate and rescue his mother-in-law, but became lost in the confusion and disappeared under the water. His body was found washed up on the shore later that day (Proctor, pp. 253-254). Downing's death came at age 37 when he was at the pinnacle of his career after only 12 years of public life, and was one of the most widely read and respected men in America.

William Cullen Bryant's second volume of *Picturesque America* began with a chapter on the Hudson River. His words of praise for the Hudson, as it terminates at New York City, are a fitting end to this account of the river and its role in shaping America's attitude toward natural scenery:

... the river flows on in a broader

stream, until on its eastern side the city begins, and the stream changes its aspect, and passes between the crowded shores that send out across it the noisy thunder of their busy life ... the long reaches of [the] still stream, make a sudden end, as the Hudson sweeps grandly and quietly down to the sea (Bryant, 1874, vol. 2, p. 22).

I think it is fair to say that today most Americans regard wilderness and natural scenery as beautiful. Many of us also tend to share the belief that life in the country is somewhat of an idyllic life-style—hence the popularity of our ubiquitous suburbs and subdivisions. Yet how many of us realize that this ideal originated relatively recently in our history, in the brief period between about 1820 and 1860, and in a relatively small corner of this continent? It is my conclusion that our love of natural landscape scenery is traceable to the area surrounding the Hudson River and that much of our visual sensitivity toward nature derives from the images of that region produced by the painters of the Hudson River School. Furthermore, our paradigm of what constitutes a beautiful home environment is also attributable to that same time and place.

NOTES

1. The word "landscape," in this paper, is used in accordance with its popular usage in this country today. Most Americans consider a wilderness or a tract of land in whatever natural or human-altered state it is in—or a view or scene of such a land area—to be a landscape. Etymologically, "landscape" derived from the German word "landschaft" and meant an aggregation of persons and structures within a clearing and surrounded by a wilderness. Hence, the human-made landscape and the undeveloped forest around it were opposites (Stilgoe, pp. 3, 12).
2. While Cole preferred to produce compositions, Gilmor, his patron, did not. He told Cole, "I prefer real American scenes to compositions ... 'home scenes.'" In 1836 Cole produced his most true-to-nature picture with his "Oxbow on the Connecticut" (Novak, pp. 67, 73).

3. Since many of the landscapists, such as Asher Durand, began as engravers, they were conditioned to both look at, and represent, great detail. Susan Sontag in *On Photography* states that photographs, "[l]ike a pair of binoculars with no right or wrong end . . . make exotic things near, intimate; and familiar things small, abstract, strange, much farther away (Sontag, p. 167). This was also the case with the composition landscapes of Cole and others.
4. Thomas Jefferson had remarked about the magnificent surrounding landmarks of his *Monticello* that if the country of Fluvanna, which was visible from his land, was a lake, and nearby Willis's Mountain was a volcano, his scenery would be perfect (Creese, p. 45).
5. Emanuel Swedenborg was an eighteenth-century Swedish scientist and mystic who believed in a "great chain of being," or "grand harmonic system," composed of three corresponding states—the material, the spiritual, and the divine. Americans who followed this thinking believed nature to be the direct link to a higher reality. Emerson and many of the nineteenth-century Transcendentalists were also Swedenborgians. In his "Nature" (1836), Emerson stated that "[e]very natural fact is a symbol of some spiritual fact." He further expressed that in order for man to find oneness with God, he must "[b]uild therefore, [his] own world" (Wilson, p. 87).

BIBLIOGRAPHY

- Archer, John. "Country and City in the American Romantic Suburb." *Journal of the Society of Architectural Historians*, 1983. 42:(2), 139-156.
- Bryant, William Cullen. *Picturesque America*. 2 vols., New York: D. Appleton and Co., 1874.
- Chase, David B. "The Beginnings of the Landscape Tradition in America." *Historic Preservation*, January 1973, 35-41.
- Clark, Eliot. *History of the National Academy of Design*. New York: Columbia University Press, 1954.
- Creese, Walter L. *The Crowning of America: Eight Great Spaces and Their Buildings*. Princeton: Princeton University Press, 1985.
- Cole, Thomas. "Essay on American Scenery." *American Monthly Magazine*, 1836. 1:(1), 1-12.
- Davidson, Marshall B. *History of the Artist's America*. New York: American Heritage Publishing Co., 1973.
- Davies, Jane B. "Llewellyn Park in West Orange, New Jersey." *Antiques*, 1975. 107:(1), 142-158.
- Downing, Andrew Jackson. *A Treatise on Landscape Gardening as Adapted to North America*. New York: Wiley and Putnam, 1844.
- Downing, Andrew Jackson. *Horticulturist*, 1847. 2:(4), 152-160.
- Downing, Andrew Jackson. *Horticulturist*, 1848. 3:(1), 9-14.
- Downing, Andrew Jackson. *Horticulturist*, 1848. 3:(4), 153-158.
- Fitch, James Marston. *Architecture and the Esthetics of Plenty*. New York: Columbia University Press, 1961.
- Hargrove, Eugene C. "The Historical Foundations of American Environmental Ethics." *Environmental Ethics*, 1979. 1:(1), 217-218.
- Heimert, Alan. "Puritanism, the Wilderness, and the Frontier." *The New England Quarterly*, 1953. 26:(3), 361, 382.

- Howat, John K. *The Hudson River and its Painters*. New York: Viking, 1972.
- Huth, Hans. *Nature and the American: Three Centuries of Changing Attitudes*. Berkeley: The University of California, 1957.
- Irving, Washington. *Rip Van Winkle and The Legend of Sleepy Hollow* (Second Edition). Tarrytown: The Sleepy Hollow Press, 1980.
- Leveson, David. "Geologic Clarity: A Geologist's Perspective on Landscape Aesthetics." *Landscape Journal*, 1989. 7:(2), 85-94.
- Lowenthal, David. "Age and Beauty." *The Aesthetics of Landscape: Proceedings of a Symposium held at the University of Hull: 17-19 September, 1976*. Jay Appleton, editor. Hull, England: The University of Hull, 1976.
- Mann, William A. "The Beginnings of Landscape Gardening in America: 1758 to 1845" (unpublished manuscript). Athens, Georgia: The University of Georgia, 1989.
- M'Mahon (McMahon), Bernard. *The American Gardener's Calendar Adapted to the Climate and Seasons of the United States*. Philadelphia: T. P. M'Mahon, 1806.
- Mather, Frank Jewett, Jr. "The Hudson River School." *American Magazine of Art*, 1934. 27:(6), 297-306.
- Miller, Lillian B. *Patriots and Patriotism: The Encouragement of the Fine Arts in the United States 1790-1860*. Chicago: University of Chicago Press, 1966.
- Novak, Barbara. *American Painting of the Nineteenth Century*. New York: Praeger Publishers, 1969.
- O'Brien, Ray J. *American Sublime: Landscape and Scenery of the Lower Hudson Valley*. New York: Columbia University Press, 1982.
- Proctor, John Clagett. "The Tragic Death of Andrew Jackson Downing and the Monument to His Memory." *Records of the Columbian Historical Society*. John B. Larnier, editor. New York: Columbian Historical Society, 1925.
- Reynolds, Helen W. "Country-Seats on the Hudson River in Dutchess County." *Dutchess County Historical Society Year-book, 1935*. 60-70.
- Richards, T. Addison. "Idlewild: The Home of N. P. Willis." *Harpers Magazine*, 1858. 16:(92), 145-166.
- Schuyler, David. *The New Urban Landscape: The Redefinition of City Form in Nineteenth-Century America*. Baltimore: The Johns Hopkins University Press, 1986.
- Shepard, Paul, Jr. "They Painted What They Saw." *Landscape*, 1953. 3:(1), 6-11.
- Shepard, Paul, Jr. "The Cross Valley Syndrome." *Landscape*, 1961. 10:(2), 4-8.
- Snyder, Martin P. "William Birch: His Country Seats of the United States." *The Pennsylvania Magazine of History and Biography*, 1957. 81:(3), 225-254.
- Sontag, Susan. *On Photography*. New York: Farrar, Straus, and Giroux, 1978.
- Stilgoe, John. *Common Landscape of America, 1580 to 1845*. New Haven: Yale University Press, 1982.
- Wilmerding, John, editor. *The Genius of American Painting*. London: Weidenfield and Nicolson, 1973.
- Wilmerding, John. *The Waters of America: 19th-Century American Paintings of Rivers, Streams, Lakes and Waterfalls. Exhibition Catalog of the Historical New Orleans Collection*. New Orleans: Historical New Orleans Collection, 1984.
- Wilson, Richard Guy. "Idealism and the Origin of the First American Suburb: Llewellyn Park, New Jersey." *The American Art Journal*, 1979. 11:(4), 79-90.

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III. Design and Planning

Integrated Recreational Open Space Systems: Planning Concepts and Implementation Strategies

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As one heads north from San Diego on Interstate 5, the Pacific Ocean stays within sight until the road enters Orange County and swings slightly inland along a valley floor defined by steeply sloped ridgelines rising to enclose the small historic city of San Juan Capistrano. Settlement in the valley developed around the abundant year-round fresh water supplied by a network of creeks draining from the upland towards the ocean, centered on El Camino Real, the eighteenth-century mission road which today's freeway parallels closely.

One could imagine such a city having an integrated system of verdant linear parks strung along the floodplains of the creek corridors, protecting riparian habitat, making use of an area where development is prohibited because of flood danger, and celebrating the watercourses that have shaped and brought life to the community. From there, open space corridors would lead trails up to the dominant ridgelines and along to hilltop parks, where visitors can capitalize on panoramic views out over the Pacific Ocean and enjoy the cooling sea breezes to mitigate the summer heat.

Instead one finds a park system comprising isolated park sites dotted randomly around the city. The system only partially

meets recreational needs and almost totally fails to take advantage of the city's intrinsic landscape opportunities or to contribute to environmental resource management. Rather, the park system represents a typical history of leftover pockets of unbuildable land having been fobbed off onto a city by developers somewhat cynically fulfilling their park dedication requirements. Overhead power lines, inaccessibility, minimal facilities, and steep slopes characterize many of the sites.

This unfortunate situation can be clearly linked with the city's lack of any coherent plan by which to develop a system of recreational open space, let alone one integrated with environmental resource management or contributing to identity by capitalizing on the community's landscape aesthetic.



Figure 1. Channelized creeks in San Juan Capistrano have destroyed an aesthetic amenity and preclude the integration of resource management and recreation.

Forty miles south of San Juan Capistrano lies the city of San Marcos, in many respects a similar community with development concentrated in valley floors that run between dominant, generally undeveloped, ridgelines. Facing intense growth pressure, San Marcos recognized the potential for open space systems as a tool for managing future growth. Early enough in its growth it have the opportunity to plan the majority of its recreational system prior to development, thereby avoiding the problems experienced in San Juan Capistrano, San Marcos recently put in place a master plan and an implementation strategy (including a new implementation tool—the idea of flexible park development zones tied to a mandatory set of program-related performance standards) designed to achieve an integrated recreational open space system. This system, both physically linked and multifunctional, aims to meet community recreation needs, utilize distinctive landscape characteristics to enhance community recreation needs, utilize distinctive landscape characteristics to enhance community identity, and contribute to environmental resource management (Wallace Roberts & Todd, 1989).

EVOLUTION OF AN IDEA

Neither the idea of a planned open space and recreation system nor the idea of integrating resource management with recreation opportunity is new. Fairmount Park in Philadelphia, one of the largest urban park systems in the world, was established by city ordinance in 1855. The primary purposes in establishing the system were both to protect the city's watersheds, providing for protection and enjoyment of natural environments, and to provide a diversity of recreational opportunity for the city's residents, goals which the current master plan for Fairmount Park perpetuates (Wallace Roberts & Todd, 1983).

Towards the end of the nineteenth century, Boston City Council authorized and financed the acquisition, design, and construction of a major park in the Back Bay area. Frederick Law Olmsted became involved in the project and quickly allied with the city engineer in recognizing the need to solve some severe drainage and flooding problems in order to achieve any kind of successful recreational amenity on the site. Before grading had even begun for Back Bay Park, Olmsted had conceived of a much more extensive linear park system that would provide a continuous loop of open space as counterpoint to the urban fabric (Newton, 1971). Within a typically naturalistic scene, incorporating strolling and bridle paths and canoeing on the waterways, Olmsted had transformed miles of potential wasteland plagued by sewage and refuse into a public amenity integrating engineering needs with resource conservation, aesthetics, and recreational amenity.

Concurrent with Olmsted's work in Boston, Ebenezer Howard was working in England on his vision for planned new towns integrating the benefits of both urban and rural environments. Published in 1902, Howard's seminal planning study "Garden Cities of To-Morrow" presented his philosophy for the development of truly humane cities where open space for agriculture as well as public health, safety, and recreation would be woven throughout the urban fabric (Howard, 1965). The recreational, civic, social, and spiritual foci of the ideal city would all be within an integrated open space park system.

Howard's ideas were most closely realized in the development of Welwyn Garden City. Here, planner Louis de Soissons developed the urban form around an open space corridor which runs through the city's core and connects the city's primary civic institutions. The design derives from both natural and cultural landscape patterns.

CURRENT STATUS

Given the historic precedent for integrated open space planning, and the rise in environmental consciousness that heralded in the 1960s, one might expect this integrated approach to be commonplace. Yet even in wealthy nations like the United States, which surely have the economic wherewithal to protect their landscape heritage, examples abound of natural resources needlessly obliterated by bulldozer and concrete.¹ It is ironic today that the regions facing the most rapid growth and the imminent threat of natural resources being consumed by rapacious development may also be those where integrated planning may have its best opportunity for support. A high level of citizen concern over the loss of open space and the need for growth management translates into political and hence budgetary support, which might be absent in an area of slow growth. In areas of rapid growth there is also significant potential for the generation of revenues through development impact fees to help fund open space and parkland acquisition, design, and construction.

Citizen concern and consequent political support certainly played a major role in San Marcos, and evidence also exists to suggest that the correlation between rapid growth and pressure for comprehensive open space and recreation planning is not limited to Southern California. The rapid expansion of population and associated development pressure in Hong Kong over the past two decades led to the initiation, in 1987, of a study of Lantau Island, a popular and relatively unspoiled island recreation destination facing increasing development pressure. The purpose of the study was "to formulate a strategy to guide development in South Lantau within the framework of landscape conservation, with an emphasis on recreation-oriented uses" (Shelton, 1989, p. 23).

Exceptional cases exist where integrated

recreational open space planning occurs before any development. It is more typical, however, that recreation planning in urbanizing areas is concerned with retrofitting parks and open space into areas already built in addition to having some opportunity to plan for areas as yet undeveloped.

Planning for integrated recreation in a developed area may seem hopeless, but there is often considerable potential, and recreation planning may even form the catalyst for much-needed redevelopment. Planning for the Hudson Waterfront Walkway, for example, addressed retrofitting a sixteen-mile linear park along the New Jersey shore of the Hudson River, a landscape resource of national significance. Until recently, most of the waterfront was occupied by a daunting array of cargo facilities and rail yards. However, with changing needs and priorities, a plan was prepared, and, with much of the area currently under redevelopment, extensive portions of the walkway have already been completed. The primary implementation strategy for the plan involves land use control over private property. Under New Jersey coastal-zone legislation, all developers of property on the river must dedicate easements for and construct and maintain the walkway within their development and provide for connections with the rest of the continuous walkway system. By reopening public access to the waterfront for recreation, the plan allows people to interact with the region's most significant landscape feature in an area previously despoiled by industrial activity. The Hudson Waterfront Walkway must be one of the rare examples of real human benefit derived, at least in part, from the demise of railroads in favor of road freight haulage.

Stuttgart, West Germany, lies in a bowl-shaped depression surrounded by hills and often suffers from temperature inversions which trap polluted air. In response to the problem, the city has adopted planning ordinances that both restrict development

and encourage the establishment of new public open space in the direction of the city's prevailing wind. By combining public recreation with air quality management, Stuttgart provides an unusual example of a community planning for integrated open space in currently developed urban areas.²

The design in the early 1970s of the Woodlands New Community in Texas provides an example of a comprehensively planned new community. The intent was to integrate a full range of social and recreational services with natural resource conservation. The ecological planning method utilized rested on the belief "that the landscape and its natural processes offer opportunities and constraints for land utilization. By identifying and interpreting explicit natural phenomena . . . the planner is able to specify the most and least suitable land use for a particular landscape" (Wallace McHarg Roberts & Todd, 1974, p. 1). By correlating natural processes, recreation opportunities and constraints, and other pieces of information, a composite plan was formed in which the distribution of natural resources and intrinsic potential of the landscape for recreation played fundamental roles in determining the ultimate urban form.

PLANNING APPROACH AND IMPLEMENTATION STRATEGY

If an integrated approach is to be successfully applied, it is essential that recommendations be based upon an appropriate and coherent methodology. McHarg's struggle in the '60s to quantify the more intangible aspects of ecological planning, in order to counteract the apparent rationality of conventional engineering, finds a close parallel here: without a rational and identifiable methodology, it will often be hard for open space recreational needs to compete successfully against other public facility demands on a city's funds. Most importantly, the planning method should deal with the real place, not

an ideal place. Although abstract concepts play a part in planning, any models must be consistent with a given city's conditions. Three primary planning goals can be identified: meeting the recreational needs of the community, weaving distinctive aspects of the natural and cultural landscape into the open space system in order to enhance the definition of community's identity, and integrating development with environmental resource management.

Meeting recreational needs requires a tried and tested planning process. Needs analysis may take a variety of forms, including mail or telephone surveys, meetings with special interest groups, comparative studies of similar communities, and research of relevant publications. It should be noted that some recreation planners are calling for a more subjective, experiential, qualitative approach to recreation needs analysis in contrast with traditional statistical approaches.³ The planning methodology will need to address a variety of contextual information regarding development; demographics; the existing planning framework as set out in documents such as the General Plan, specific plans, and the municipal code; existing open space and parks; and existing financial and implementational techniques employed in the city. Interaction with the public will elicit the concerns of the user and also help generate support by publicizing proposals.

Needs will ultimately be expressed during planning as a description of the facilities and programs that the overall recreation system should provide for the community. The planning study will search for sites that can physically accommodate these programs and facilities, and for landscape resources that offer physical opportunities, such as surface water bodies for aquatic activities or level ground for active sports.

While landscape analysis addresses direct physical needs, the second goal of an

integrated approach necessitates a search for a more subtle level of information, for the essence of the cultural and natural landscape which helps to define the city's distinctive character. If the recreational system allows citizens access to, understanding of, and identification with those landscapes that inform the character of place, then the system will help nourish people's sense of belonging. The objective is to avoid the alienating formal ubiquity of much contemporary development. An analysis of the natural processes that have shaped the landscape will go hand-in-hand with an exploration of the significant facets of social history and cultural identity in order to understand the local landscape resources which could reinforce or create a sense of place.⁴

To fulfill the third goal, the analysis of natural processes must also be structured to reveal the value of the environmental resources of the study area. (While some environmental philosophies include the notion of intrinsic environmental needs, the attachment of value to environmental resources is, it is argued, an inherently cultural process.) In the search for integration, the prime locations are those where an environmental resource determined to require conservation also offers recreational potential. A good example would be a watercourse and floodplain with valuable riparian habitat. Development of the area would destroy habitat, probably incur mitigation costs, and remove from the landscape a feature that has had a formative role in that landscape's evolution. Utilization of this area for a linear recreation site would avoid these negative consequences and permit high-quality passive recreation. It is important to recognize that in certain instances some environmental resources will be so sensitive to disturbance that even limited passive recreation could destroy the value of the area. In other cases the distribution or characteristics of natural resources will simply not coincide with recreation needs.

However, although resource management and recreation provision will not always go hand-in-hand, they should be considered together so that opportunities for integration are not missed.

The final phase of the planning study involves bringing pertinent surveys and analyses together into an integrated plan. Typically, achievement of the central project goals will be explored through a number of alternative schemes before a final solution is selected and refined. A successful plan must have this sustained central vision, even though the details will change over time. This approach is preferable to relying on a collection of miscellaneous agenda items born out of an incrementalist approach and supposing that if sufficient attention is paid to the details the grand scheme will somehow fall into place.

The best planning document will remain a purely academic exercise unless some strategy is developed for its implementation. Although identified as a separate component, implementation will pervade planning from the beginning. For example, it is essential that the plan should be realistic; there is no point in setting standards that the city is unlikely to achieve. Typically, implementation will be articulated through a ranked and phased set of goals and objectives, allowing the controlling agency to prioritize the allocation of its resources and to predict the need for various kinds of action. A degree of flexibility in the strategy will allow for changing circumstances over time; for the same reason, an ongoing or periodic revision might be scheduled. The strategy should be comprehensive in uncovering all appropriate implementation opportunities and a variety of potential funding sources for each aspect of the plan. Both the implementation opportunities and funding sources may also be prioritized. Implementation and funding approaches should be consistent with the city's overall approach to public facilities provided that this approach is tailored to the

special circumstances pertaining to open space and recreation. Finally, for success, the plan and implementation strategy must be supported by those with budgetary control and be adopted and consistently applied to all planning and design projects.

THE CITY OF SAN MARCOS: AN EXAMPLE

The city of San Marcos, located 30 miles north of San Diego, is currently facing intense growth pressure. A 1970 population of around 3,000 has swelled today to over 30,000, and the city has a build-out population projection of 110,000 anticipated as early as 2005. Typical of recreational open space planning in a rapidly urbanizing context, there were two distinct planning and implementation situations. The city is already one-third built out and thus contains existing urban fabric that presents problems typical of any developed area. At the same

time San Marcos still has large undeveloped areas presenting the opportunity of relatively unconstrained planning.

As part of its efforts to manage accelerating development, the city of San Marcos in 1987 appointed a Growth Management Task Force to review a wide range of growth-related planning issues. One of the seven major conclusions the task force presented in its final report was that there was a deficiency in the city's provision of public parkland. In response, the City Council initiated the preparation of a city-wide Park Master Plan and a Parks and Recreation Element for the General Plan. The project included a survey and analysis, development of alternatives, extensive public input, and staff review and direction, all of which led to the selection of a preferred concept plan. This concept was then developed to indicate the broad location and type of recreation facilities to be present in the city by build out. Finally, an implementation plan was



Figure 2. *San Marcos is early enough in its development to have the opportunity of planning most of its recreational open space system prior to development.*

prepared, outlining funding, acquisition, and phasing strategies designed to facilitate successful achievement of the plan's vision.

The city has a range of natural characteristics that both define its landscape and provide recreation opportunities. At the most general level is a Mediterranean climate, which controls the natural landscape and encourages outdoor recreation. Although the climate is semi-arid, drainage corridors are one of the most significant natural features in the landscape. The drainage and riparian network provides excellent opportunities for establishment of interconnected open space throughout the city.

Steeply sloped mountainous ridgelines visually dominate the city and confine the more intensive development to the valley floors. The utilization of ridgelines for recreational open space not only offers high-quality passive recreation opportunity, for example trails to panoramic views, but also offers a mechanism through which the city's most conspicuous landscape feature can be conserved as open space, ensuring its continued contribution toward the community's identity.

Limited annual precipitation has led to mixed chaparral and coastal sage scrub habitats covering the ridgelines, while the valleys accommodate grassland and riparian vegetation, both of which are sensitive to disturbance and rare in the region. The low availability of moisture to support large shrubs and trees makes any kind of high woody cover especially valuable. The vast majority of natural vegetation in the city has the capacity to accommodate passive recreation without destroying its value, although certain critical areas may have to be kept under restricted public access. While San Marcos has adopted some regulations to help protect natural resources, the integration of recreational open space use into areas of habitat value will probably assist in the long-term conservation of at least a portion of these resources. The city

has a number of surface water features. The largest, Lake San Marcos, is already surrounded by private development, precluding public access, testament to the loss of resources likely in the absence of a planning strategy. The other significant lakes all have passive recreation potential.⁵

While in an entirely planned community such as Woodlands the definition of the open space system may form the primary parameters for development and determine the ultimate urban form, the circumstance in San Marcos is more typical. A number of specific factors impacted the plan development. The existence of areas in the city that were already developed gave a high priority to park siting on any remaining open space. Undeveloped areas of the city contained both a number of large land holdings, up to 2000 acres, for which implementation negotiation would be relatively simple, as well as areas fragmented into numerous small holdings, which would involve negotiation with a large number of land owners. Projections of road development, General Plan land use designations, and zoning all served to create differential land values among the undeveloped land parcels, thus further complicating siting and implementation planning. Major future projects such as a new civic center, a new California State University campus, and a large county landfill with extensive life span but projected park afteruse all affected the planning process. The existing park sites had to be taken into account, even if their siting did not fit the new comprehensive approach to site location.

Determination of recreation needs involved a community survey mailed to every household in the city. A number of community workshops and meetings with special interest groups were held to elicit the citizens' desires. Two dominant themes that emerged were broad support for a wide range of park sites, reflecting a perception of inadequate existing public recreational open space, and

the desire to see a city-wide interconnecting trail system.

The plan itself contains four main components, together forming a system of park nodes and greenway links allowing ready access to open space and recreational opportunities throughout the city. Regional parks provide extensive acreage for informal unstructured recreation. Community parks in each area of the city each develop a unique theme, such as water play, active sports, or equestrian use. Smaller local parks are distributed throughout the city, concentrated in family-oriented communities. A trails system for pedestrians, cyclists, and equestrian users is threaded through the open-space corridors linking parks, open spaces, and major activity nodes such as the proposed campus and the city's central civic/commercial core.

The primary landscape resources—its dominant ridgelines and creek corridors—were integrated into the recreation plan for the city. The majority of the ridgelines were intended to accommodate trail connections within open-space corridors, thereby preserving the natural skyline. At significant vista points, the trails will open up to allow resting places that capitalize on the panoramic views. On the city's most dominant peak along its southern ridgeline, a major regional park facility has been sited. The creek corridors formed a natural basis for the valley trail system, allowing the intertwining of public access along and through some of the most varied and attractive landscape in the city. With flood control and riparian mitigation both impacting heavily upon potential development, the planning for recreation use in these areas provided a positive rationale to accompany the more negative and restrictive, but necessary land use controls intended to preserve these special features of the city in perpetuity.

In its goal to provide for the community's recreation needs, particularly with regard to active sports, the use of numerical

standards, such as a population-ratio analysis of recreation facility needs, formed a part of the planning process. However, the inclusion of a landscape opportunities assessment moved the plan away from being a purely statistical document unrelated to the city's special characteristics to one that helped to identify, reinforce, and perpetuate the identity of the community.

The primary focus of the implementation strategy is public-private collaboration relying on a system of development agreements. A public facilities fee will be the primary revenue generator, while in-lieu fees and land dedication from major subdivisions will also be collected under a Quimby parkland dedication ordinance. General funds and other secondary sources will provide supplementary funding, particularly for previously built-out areas. A phasing plan was developed which prioritized parkland and trail acquisition and improvements according to anticipated submittal of development proposals to the city. Components of the plan that were considered under threat from development or particularly critical to its success were phased into the first five years of the plan's implementation.

A unique feature of the plan is the creation of park development zones that identify the general location of park sites rather than their precise boundaries. By tying the development zone to a set of mandatory program-related performance standards, the city was given a tool that guaranteed achievement of the necessary recreation facilities yet allowed a flexible and cooperative relationship with the development community.

Integration of landscape resources into the plan was largely accomplished during the planning process. However, some facets of implementation specifically related to environmental resource management included easement purchases for sensitive habitats to form buffers around more active parklands.

Planning for San Marcos Creek provided

a special opportunity to combine resource management with recreational and aesthetic amenities in an area of particularly intense development pressure. Existing proposals for the creek in its downtown section call for construction of a concrete-lined trapezoidal channel to accommodate potential flood flow and thereby permit the construction of a major commercial core on one side of the channel and high-density housing on the other side. This solution to downtown floodplain problems would involve considerable loss of valuable riparian habitat in addition to the decimation of one of the most picturesque components of the San Marcos landscape. In an alternative proposal, endorsed by the Parks Master Plan project, a two-sided mixed-use zone would stretch along either side of a more natural channel in which the flood control function would be accommodated, environmental resources protected, a primary aesthetic resource preserved, and recreation benefit accrued. Furthermore, it is likely that this integrated approach would have a positive effect on adjacent land values.

FUTURE PROSPECTS

By committing to a comprehensive approach to recreation planning early in its development, San Marcos has gained the potential for an increased quality of life and enhanced community identity, both of which neighboring communities have already lost. It is already apparent in travelling through the region, which of the cities have actively grappled with open-space issues. The differences will become more obvious with time. Nevertheless, it is probably never too late to begin a commitment to planning for open space recreational, aesthetic, and environmental benefits. The success of Stuttgart provides a clear example of the potential in applying strategic vision to previously built-out areas. San Juan Capistrano, where many opportunities have already been lost, still has a number of

options by which essential components of its community character and recreational provision can be enhanced, and environmental resources protected.

How optimistic can we be that such planning will be undertaken and implemented future? To say that these two communities' endeavors are on their own indicative of a more comprehensive approach to integrated recreation and resource planning in the future would be tenuous at best. However, a number of other indicators also point to a hopeful future. There seems to be general evidence that increasing development and loss of open space tend to bring about increased public pressure for careful planning. Across California this result is perhaps best confirmed by a recent spate of voter-approved bond issues, tied to increased taxation, for the express purpose of growth management through open space planning. At a national level, on Capitol Hill the U.S. House recently began a series of hearings on "The American Landscape in the 21st Century" to determine "what role the federal government can play in protecting communities against runaway overdevelopment." At the first hearing speakers from a wide range of backgrounds called for federal support for comprehensive and regional planning. Barbara Bryant, senior vice-president of Market Opinion Research, stressed that money for planning is available, testifying that "[t]he Public strongly supports government involvement, even earmarked additional taxation, for the purposes of protecting the environment, preserving natural areas, and preserving wildlife." Further federal interest is evident in the proposed American Heritage Trust Act of 1989, which, although not expected to come to the House floor in the near future, contains a strong commitment to planning open space and outdoor recreation (Finucan, 1989). At the international scale, evidence such as the planning project for South Lantau in Hong Kong suggests that the correlation between

increased development pressure and support for open space planning holds true across cultural boundaries.

The need is present, and seemingly so too is the public and financial support. What is required if such visions are to be achieved is the concerted actions of land use professionals and national, regional, and local administrators to promote actively a comprehensive integrated approach to planning open space for the future.

NOTES

1. The despoliation of landscape has been well chronicled by a variety of authors. Ian McHarg's *Design With Nature* (1971) provides both a local and global perspectives on the destructive results of reckless development.
2. For a discussion of air quality planning in Stuttgart, see Spirn, 1984, pp. 82-85.

3. Chapter 12 of Seymour Gold's book *Recreation Planning and Design* (1980) deals thoroughly with needs analysis. An interesting presentation was made at the 1988 American Planning Association California Chapter Annual Conference by C. Hamilton, R. Paige, and D. Gray. Entitled "Recreation Space in the 21st Century," it particularly stressed planning approaches which dealt with experiential qualities of recreation provision.
4. Two recent articles in *The New Yorker* by Tony Hiss provide a fascinating review of what is identified as the landscape or regional approach to metropolitan planning, discussing the idea of reflecting rather than obliterating past landscape form in new urban growth, particularly through open space.
5. A detailed analysis of natural resources in the city can be found in the City of San Marcos General Plan.

BIBLIOGRAPHY

- Finucan, Karen. "Washington Report: Focus on Open Space," *Planning*, Vol. 55, No. 7, 1989.
- Fogg, George E. *Park Planning Guidelines Revise*. Alexandria, Va.: National Recreation and Park Association, 1981.
- Gold, Seymour M. *Recreation Planning and Design*. New York, N.Y.: McGraw-Hill Book Company, 1980.
- Hamilton, C.; Paige, R.; and Gray D. "Recreation Space in the 21st Century." 1988 American Planning Association California Chapter Annual Conference.
- Hiss, Tony. "Encountering the Countryside—1" *The New Yorker*, August 21, 1989, pp. 40-69.
- Hiss, Tony. "Encountering the Countryside—2" *The New Yorker*, August 28, 1989, pp. 37-63.
- Howard, Ebenezer. *Garden Cities of Tomorrow*. Cambridge, Mass.: M.I.T. Press, 1965.
- Lancaster, Roger A. *Recreation, Park and Open Space Standards and Guidelines*. Alexandria, Va.: National Recreation and Park Association, 1983.
- McHarg, Ian L. *Design With Nature*. Garden City, N.J.: Doubleday / Natural History Press, 1971.
- Newton, Norman T. *Design on the Land: The Development of Landscape Architecture*. Cambridge, Mass.: Belknap Press of Harvard University Press, 1971.
- Reed, David J.; and Perdue, Richard R. *Park Planning and Design: An Evaluation Approach*. Alexandria, Va.: National Recreation and Park Association, 1979.
- Spirn, Anne Whiston. *The Granite Garden*. New York, N.Y.: Basic Books, 1984.
- Wallace McHarg Roberts & Todd (WMRT). *Woodlands New Community: An Ecological Plan*. Philadelphia, Pa.: WMRT, 1974.
- Wallace Roberts & Todd (WRT). *Fairmount Park Masterplan—Summary*. Philadelphia, Pa.: WRT, 1983.
- Wallace Roberts & Todd (WRT). *San Marcos Parks Master Plan*. San Diego, Calif.: WRT, 1989.

Design Studies for the Rockville Facility Right-of-Way

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INTRODUCTION

The firm Clarke + Rapuano Inc. was hired by Maryland National Capital Park and Planning Commission (MNCPPC) to develop design feasibility studies for the Rockville Facility, an eight-mile-long corridor acquired by the state of Maryland during the 1950s for an outer belt highway which was never built. As areas abutting the right-of-way were developed as residential communities, there was widespread neighborhood opposition to any transportation use of the corridor even as traffic congestion problems worsened. Studies were completed with cost estimates for a linear park, a four-lane parkway and a two-lane parkway in order to help MNCPPC, Montgomery County, and other local governments resolve the final land use for this right-of-way.

The corridor is approximately 8 miles long by 300 feet wide, stretching across Montgomery County from west to east. The right-of-way begins just east of I-270 and ends at Northwest Branch Park in the east, intersecting with the future Intercounty Connector. The right-of-way was conceived by Clarke & Rapuano as a linear park and/or parkway with a parallel bicycle/pedestrian path, linking the existing parklands crossed by the right-of-way. The topography and natural features, together with safe and proper traffic control and appropriate vertical and horizontal alignment, determined the design criteria for the parkway roads. The existing natural features of the right-of-way also suggested uses for recreation.

RECONNAISSANCE AND DATA COLLECTION

Maps, aerial photos, planning documents, regulations, and surveys were obtained from

MNCPPC, the Maryland State Highway Commission, and other sources. A field reconnaissance of the right-of-way identified physical conditions, including vegetation, and verified visually the existing wetlands mapping. Ten categories of vegetation types were established: meadow, mesic mixed-deciduous forest, wet meadow, lowland forest, pine-tulip woodland, tulip forest, old field, disturbed urban woodland, floodplain forest, and woody old field. (See *Table 1.*)

For most of its length, the Rockville Facility right-of-way passes through solidly established residential neighborhoods. There is a predominance of single-family detached homes on lots ranging in size from approximately 1/7 to 1/2 acre, with the smaller lots occurring most frequently. There are also some apartment developments and commercial/office development. The right-of-way is usually 300 feet wide, but it is narrower in a few locations.

The Facility crosses a range of streams and tributaries which drain to the Potomac River. The Northwest Branch of the Anacostia River is designated Class IV, a water quality classification for recreational trout waters. All the other tributaries are designated Class I, water quality suitable for water contact recreation. Only one of these streams, Turkey Branch, parallels the corridor.

A CONCEPTUAL STUDY FOR PARK USE

The Rockville Facility right-of-way presented an opportunity for interpretation without much parallel in park development. The right-of-way could be viewed as a longitudinal section through an urbanized area, revealing along its way the impact of suburban development on the various natural

Table 1. Existing vegetation.

features of the area's landscape. Viewed in this manner, the Rockville Facility right-of-way suggested a different concept in its use for a park. It was conceived as a "living ecological museum" depicting the interaction of human social activities with the natural environment, rather than as just a series of recreation sites. This approach established the framework for recreation facilities that are appropriate to the natural features of the right-of-way.

The design approach was to allow the existing natural features of the right-of-way—i.e., vegetation, topography, streams, wetlands, and floodplains—to suggest the possibilities for recreation, bearing in mind abutting land uses and major points of access and transportation. At this early stage of planning, the study did not address county-wide or neighborhood needs for recreation except in the sense that some needs could be met in a park plan for the Rockville Facility.

Each type of vegetation had its own attractive qualities, but some were more generally recognized for their attractiveness, particularly meadow, wet meadow, lowland forest, pine-tulip woodland, and tulip forest. The preservation and enhancement of such particular types of vegetation were primary objectives in the park development, permitting only the introduction of recreational uses and facilities which would not deleteriously affect the vegetation. In time, it was proposed that this protective management policy take on greater significance, because areas of good natural vegetation in Montgomery County would otherwise be forever lost to development.

The recreational uses most appropriate within a productive management policy were paths for walking, jogging, bicycling, and horseback riding; physical fitness courses; and natural trails. Being linear, they were adaptable to the length of the right-of-way, with ready access at every street intersection. Paths and trails could be easily fitted into

the topography and could be connected to small picnic areas at suitable locations. These linear uses would be especially appropriate for areas for mesic mixed-deciduous forest, lowland forest, pine-tulip woodland, and tulip forest.

Where the forest types about residential neighborhoods, particularly multi-family apartment complexes, small tot lots or play areas for young children could be located at the periphery of the woods. Such play areas should be small and located on sites requiring minimal regrading of the land form and little clearing.

The floodplain forest areas, with the exception of Northwest Branch, are generally less attractive than the areas of lowland forest. These floodplain areas, which occupy most of the right-of-way along Turkey Branch between Rock Creek Park and Georgia Avenue, are so dense that selective clearing could be permitted to create open meadows for informal play. Linear paths and trails could, of course, thread their way along the streams.

It was determined that the meadow areas should be maintained as they are, being most suitable for informal play and picnicking. Portions could be given over to tot lots, small play areas, or fitness exercise equipment. The linear paths and trails could skirt or traverse the meadows. It was recommended that uses in the wet-meadow areas be restricted to interpretive nature trails and passive observation of birds and wildlife.

Ball fields for organized team play were considered only for old fields, woody old fields, and disturbed urban woodland, which are the least attractive of the ten vegetation types. Ball fields require extensive clearing and grading, not only for play but also to accommodate parking for cars. Therefore, such uses were considered judiciously and located in relation to existing transportation arteries to make the fields accessible county-wide.

The Rockville Facility connects a number of county parks, and, if observed from the air, would be perceived as a green, open-space extension of those parks. The benefits of incorporating the Rockville Facility into the county park system as a linear connection to those parks are self-evident, particularly in integrating its green open spaces into a regional system.

FOUR-LANE PARKWAY

Design Criteria

The following design criteria for the preliminary studies were applied:

Design Speed	50 mph
Lane Width	12'-6" each (2 lanes)
Bicycle/Pedestrian Path	10 feet
Shoulders	10 feet
Median	30 feet, constant
Curbs	mountable
Maximum Grade	6.5%

Two typical sections were suggested (see Figure 1): Typical Section A, with curbed roadways and grass shoulders; and Typical Section B, with paved shoulders and curbs at the outside edge of the shoulders. Curbs were proposed in order to direct pavement runoff to a storm drainage infiltration system, to keep vehicles from encroaching on the grass roadsides, and for a neater appearance. A combined bicycle/pedestrian path running parallel to the roadway was also provided. (An example of the alignment is shown in Figure 2.)

Role as Traffic Artery

The four-lane parkway design would serve as a major east-west traffic artery, intersecting all important north-south routes that cross the right-of-way. Five major interchanges were proposed. As a four-lane road, the parkway could accommodate a lane for traffic

in each direction for high occupancy vehicles at rush hours. With multi-directional grade-separated interchanges, and a minimum of at-grade intersections, the four-lane parkway would facilitate travel through the corridor. It would become an attractive bypass route for congested existing east-west traffic routes.

The bicycle/pedestrian path could accommodate commuter bicyclists and connect to existing bicycle trails. Due to the narrowness of the right-of-way, this path could not be continuous. In some locations the path would end and begin again where there was adequate space. As an alternative, the paved shoulder in Typical Section B could be designated bicycle lanes for commuter bicyclists.

TWO-LANE PARKWAY

Design Criteria

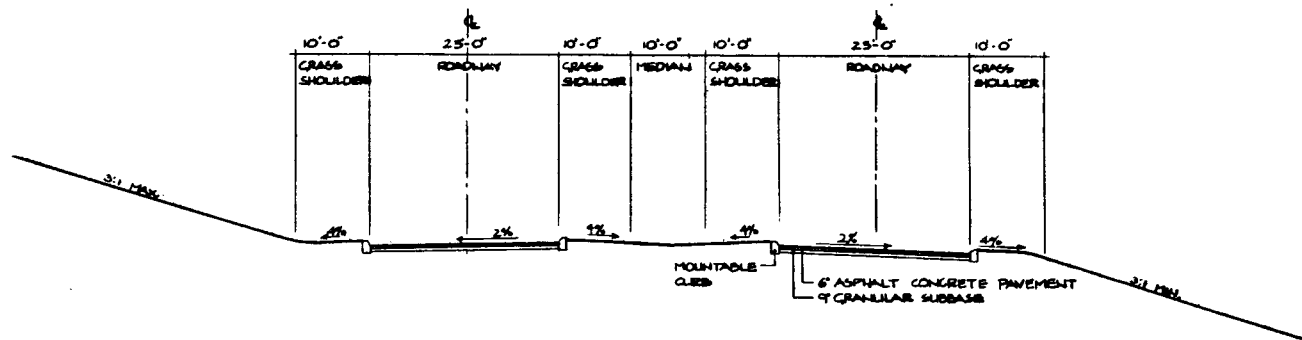
The following design criteria for the preliminary studies were applied:

Design Speed	40 mph
Lane Width	12'-6"
Bicycle/Pedestrian Path	10 feet
Shoulders	10 feet
Median	30 feet, constant
Curbs	mountable
Maximum Grade	7.5%

Two typical sections were suggested (see Figure 3): Typical Section A, with curbed roadway and grass shoulders; and Typical Section B, with paved shoulders and curbs at the outside edge of the shoulders. A combined bicycle/pedestrian path on an independent alignment from the roadway was also provided (Figure 4).

Parkway Concept and Traffic Role

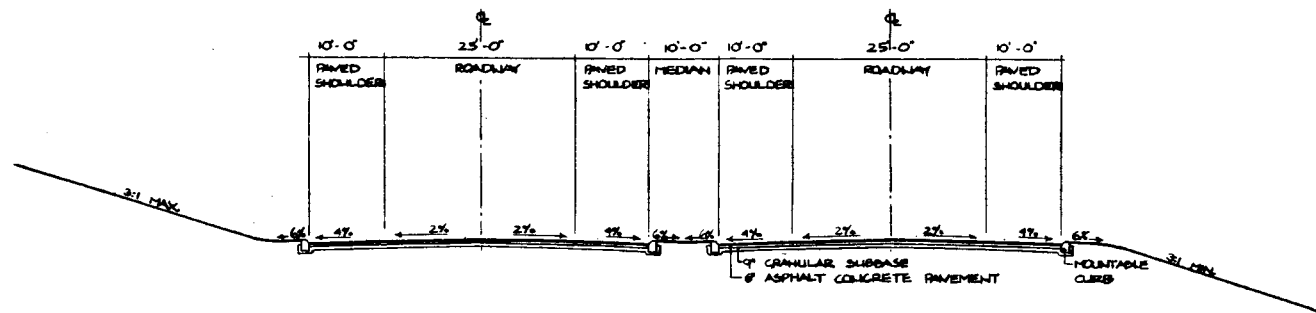
The parkway was envisioned as a park road linking three major parks, North Farm, Rock



CURBED ROADWAYS WITH STABILIZED GRASS SHOULDERS

SCALE: 1"=20'-0"

TYPICAL SECTION A



CURBED ROADWAYS WITH PAVED SHOULDERS

SCALE: 1"=20'-0"

TYPICAL SECTION B

Figure 1. Typical sections for four-lane parkway.

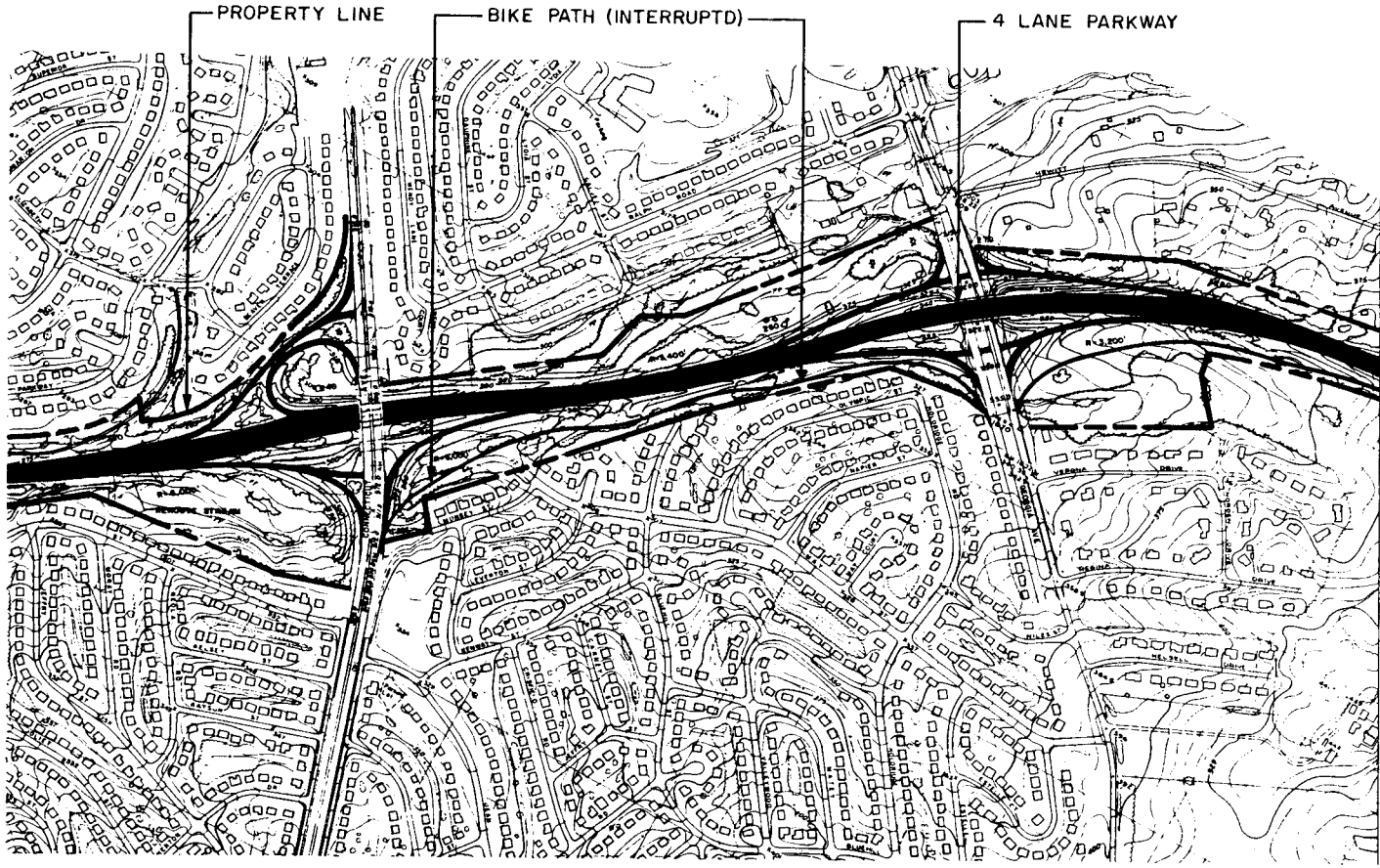
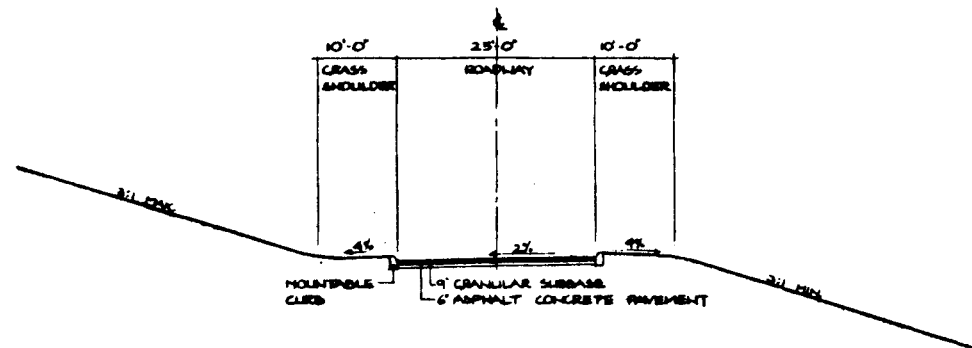


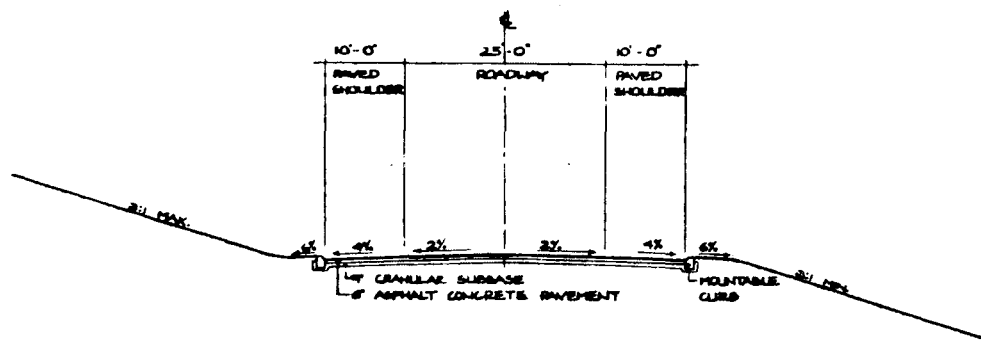
Figure 2. Alignment of four-lane parkway and bicycle/pedestrian path.



CURBED ROADWAY WITH STABILIZED GRASS SHOULDERS

SCALE: 1"=20'-0"

TYPICAL SECTION A



CURBED ROADWAY WITH PAVED SHOULDERS

SCALE: 1"=20'-0"

TYPICAL SECTION B

Figure 3. Typical sections for two-lane parkway.

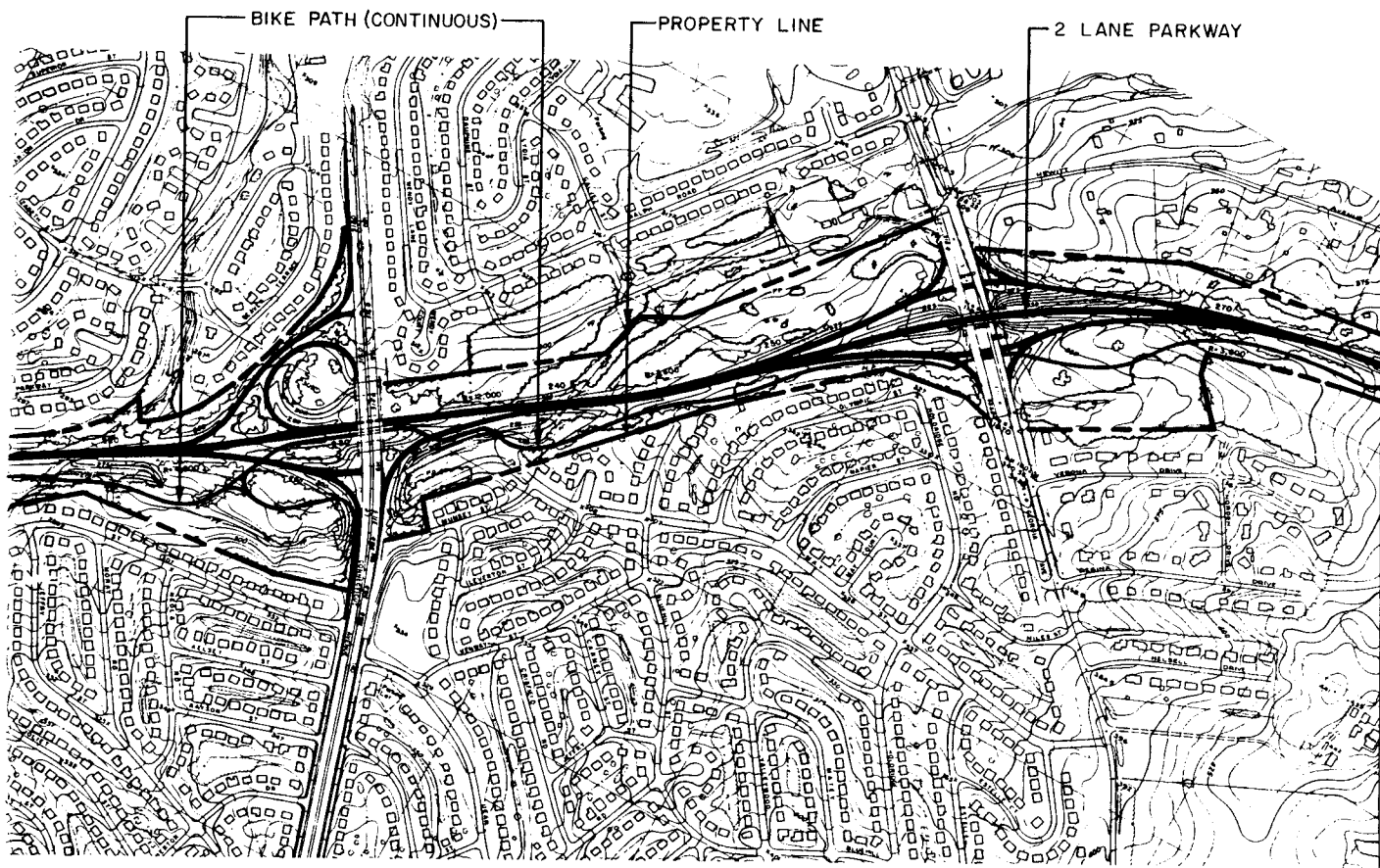


Figure 4. Alignment of two-lane parkway and bicycle/pedestrian path.

Creek, and Northwest Branch, with a curvilinear alignment fitted to the topography. The two-lane parkway crosses the same major north-south routes as the four-lane design. Although alternates that included interchanges with the Intercounty Connector were developed, these were not recommended in order to maintain the concept of a parkway linking parks and not highways. Even without this interchange, the parkway would serve as a major east-west route through the county.

Designed to lower standards than the four-lane facility, (i.e., lower design speed, fewer lanes), the two-lane parkway was not intended to be a high-volume traffic artery. Instead, its role was to provide local access to the several stream-valley parks traversed by the right-of-way. However, to increase its trip-carrying capacity during peak periods, the parkway could be designated as a reversible one-way facility during designated hours. One of the lanes, under this plan, could be reserved for use by high-occupancy vehicles (HOV lane).

The bicycle/pedestrian path could accommodate commuter bicyclists and connect to existing bicycle trails. In contrast to the four-lane design, the layout of this path in the two-lane design often moved through varied topography and vegetation at a considerable distance from the roadway. As an alternative, the paved shoulders on Typical Section B could be designated bicycle lanes for commuter bicyclists.

ENVIRONMENTAL ISSUES

Impacts on Floodplain and Stream Location

Throughout the four-lane alignment, all bridges over major streams were designed to span the entire floodplain in order to minimize filling in the floodplain and to avoid impeding flow. Further studies would determine whether these spans may be longer

than necessary. The total cost of these bridges was estimated to be \$45.4 million, or about 24% of the total estimated cost of the four-lane parkway.

Except at Turkey Branch, the parkway route generally crosses streams at right angles, minimizing both the length of bridges and the filling in of the floodplain. However, an 800-foot bridge, a 650-foot culvert, and rechanneling of 500 feet of Turkey Branch were required as the parkway crossed Rock Creek, Turkey Branch, and Veirs Mill Road. A considerable amount of filling in of the floodplain of Turkey Branch was unavoidable as the parkway extended farther eastward. One thousand feet of adjustments to stream meanders in Turkey Branch would be required as the parkway moves through the floodplain of Turkey Branch.

Throughout the two-lane alignment alternative, all bridges over major streams were designed to span the entire floodplain in order to minimize filling in of the floodplain and to avoid impeding flow. The total cost of these bridges in the preferred alignment was estimated to be \$15.8 million or about 16% of the total estimated cost of the two-lane parkway.

The impacts on floodplains were similar to those of the four-lane parkway, except that the narrower width of the two-lane roadway permitted more flexibility in siting the parkway and substantially reduced the amount of filling and rechanneling required. Therefore, four alternates at Rock Creek, Turkey Branch, and Veirs Mill were considered. The preferred alignment required rechanneling 400 feet of Turkey Branch west of Veirs Mill Road and an additional 950 feet in two locations east of Veirs Mill Road. There was some filling on the north side of the parkway in the floodplain; yet due to an alignment which follows the existing topography while allowing for clearance above the floodplain, this alternate was visually the least obtrusive design. The 1,100-

foot retaining wall indicated in the preferred alternative minimized filling in of the floodplain. This retaining wall could be eliminated, but the regrading necessary would increase the fill in the floodplain.

An evaluation of the impact of the two-lane parkway on the floodplain of Turkey Branch was carried out at five selected stations of the parkway. An existing cross-section at each station was compared to a proposed cross-section indicating grades on the parkway. The 100-year storm elevation, taken from the Montgomery County "Flood Plain Information Map," was used in estimating the volume of floodplain capacity lost due to filling and the rise in floodplain elevation. The *average* rise in water elevation along this corridor, which is approximately 1/3 mile long, was calculated to be 6.75 inches. Although precise topographic data would be required to specify the exact impact at any given location in the corridor, the projected increase in water level did not appear to cause a significant impact.

The impact on the floodplain at Northwest Branch and the ICC was minimized by a parkway alignment that avoids the floodplain as much as possible. The bridges over Northwest Branch, and all bridges over streams, would be carefully engineered not to impede flow during storms.

Since the two-lane parkway could be fitted to the existing topography better than the four-lane parkway, the amount of cut and fill could be minimized (see Figure 5). There is ample room in the right-of-way to provide for infiltration by use of open vegetated swales, natural depressions, and stormwater retention and detention structures.

Of the two typical sections, Typical Section A (with grass shoulders) would be more suitable as a park road. Within the 300-foot-wide right-of-way, a 25-foot pavement has less visual impact than the 45-foot pavement of Typical Section B (with

paved shoulders). The grass shoulders are aesthetically more pleasing in blending the road pavement into the landscape. On the other hand, Typical Section B is advantageous in that the paved shoulders can be designated bicycle lanes for commuter bicyclists and are also more stable than grass shoulders for disabled vehicles.

Impacts on Wetlands

Throughout the corridor, there was considerable filling of the wetlands in the four-lane design. Since the width of the right-of-way is 300 feet, and grading width is typically as much as 200 feet, it is questionable whether wetlands could be created within the right-of-way to compensate for those filled during grading operations.

A study was conducted to compare the total area of wetlands in the right-of-way left undisturbed by the two-lane parkway with the area of wetlands which would be filled by grading operations. Of a total wetlands acreage of 206.76, only 39.73 acres, or 19.27%, would be filled. Some acres of wetland could be created within the corridor at suitable locations as compensation for those wetlands that are filled. Further study would be needed to determine if all 40 acres of filled wetlands could be replaced.

Noise Impacts on Adjoining Properties

In 1983, the Montgomery County Planning Board set forth construction noise guidelines for land use planning and development. These guidelines establish zones of allowable noise exposure levels which depend on the county's traffic volume pattern and population density zoning. The County Department of Transportation is currently using a noise standard of 60 dBA Ldn as an interim noise standard for county highway projects. Therefore, any evaluation of the cost of noise mitigation for a new roadway should

use this standard for evaluating potential impacts. While these guidelines are being used to achieve overall goals in planning and housing development, the siting of a new parkway in a residential setting might require additional restrictive standards. The Federal Highway Administration (FHWA) uses noise abatement criteria that relate to the highway's peak hour noise levels.

For the purpose of this assessment, there were three conditions under which a direct impact could be declared:

1. If the guidelines set forth by the Montgomery County Planning Board and the County Department of Transportation are violated.
2. If the FHWA peak-hour noise level of 65 dBA is reached.
3. If the projected noise level exceeds the existing average level by 10 dBA regardless of the existing noise level. (A 10 dBA change is judged by most people as a doubling or halving of the loudness of sound regardless of the levels at which the comparative sounds are presented.)

In a narrow corridor carrying high-speed, high-volume traffic on the four-lane parkway, it was determined that there would be significant noise impacts, particularly as the parkway winds close to one side of the right-of-way or when topography directs or reflects noise towards properties bordering the right-of-way. With speeds of 50 mph, peak-hour noise levels of 68 dBA and 65 dBA were anticipated at distances of 100 feet and 170 feet, respectively, from the center line of the parkway facility. Noise levels of this magnitude would be considered significant noise impacts requiring abatement by means of sound barriers along a large portion of the right-of-way lines throughout the project.

In contrast, noise levels generated by traffic on the proposed two-lane parkway

meandering through the 300-foot-wide corridor were determined not to be of the magnitude to create many noise impacts at the right-of-way lines throughout the project area. Based on a design speed of 40 mph, peak-hour noise levels of 64 dBA and 61 dBA were anticipated at distances of 65 feet and 100 feet, respectively, from the center line of the park road. It was anticipated that noise abatement would be necessary at a few locations.

Stormwater Management

The management of stormwater for the parkway was designed in conformance with the regulations of Montgomery County. A two-part stormwater system would be required in which runoff from the impervious pavements of the parkway roads would be routed to an infiltration system while runoff from the roadsides would be directed to the existing natural watercourses.

The roadways for both the two-lane and four-lane parkway designs would have mountable curbs. Runoff would be collected in catchbasins along the curbs and piped to a retention basin. From the retention basin, the stormwater would be piped at a controlled rate to an infiltration basin. Such retention and infiltration basins would be located near the low points of the parkway and outside any neighboring floodplain.

The runoff from the landscaped, non-impervious side slopes, and undisturbed portions of the surrounding park land would be diverted from the roadway by means of grassed swales and culverts, thus allowing this unpolluted runoff to flow directly into the existing natural watercourses.

Two alternatives for stormwater management were proposed for the parkway: 1) curbed roadways with grass shoulders, and 2) roadways with paved shoulders and curbs at the outside edge of the shoulders. The runoff from both the two-lane and four-lane

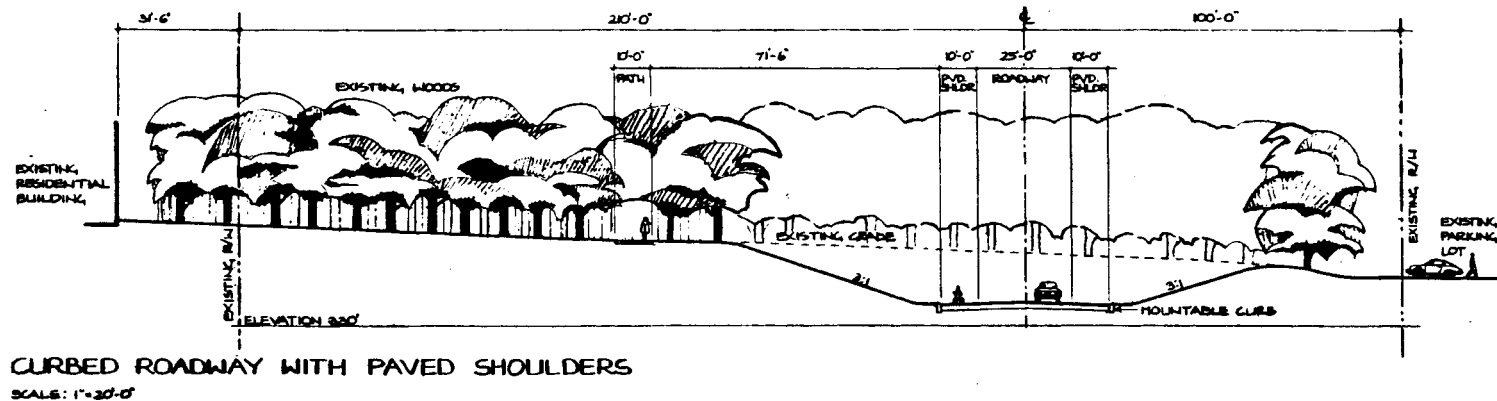
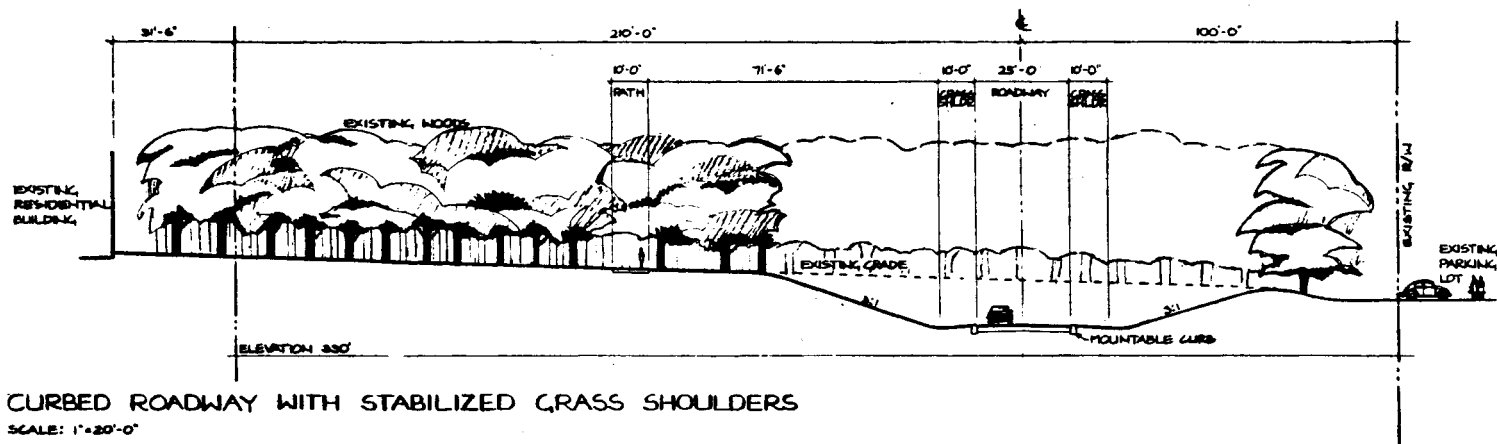


Figure 5. Modest cut section for two-lane parkway.

parkways would be substantially greater with paved shoulders than with grass shoulders, therefore requiring larger retention and infiltration basins.

Building the two-lane parkway without curbs was considered, allowing the runoff from the pavement to be infiltrated in the grass shoulders. The cost of the stormwater management system would be greatly reduced. Such a system would not require as many, if any, retention and infiltration basins, and it would cause less disturbance to the natural features. However, runoff from the roadway pavement would not be separated from runoff from the roadside; such mixing would violate the stormwater management guidelines, since there would be no interception of pollutants from the road surface.

Property Acquisition and Costs

Most of the land, 295 acres of the total 350 acres required for the parkway, is already owned by Montgomery County or the State of Maryland as part of the right-of-way. The 55 acres of privately owned land are currently undeveloped, and include 13.5 acres proposed as additional parkland.

The costs for the four-lane parkway were expected to be approximately \$187.7 million with grass shoulders and \$192.4 million with paved shoulders. These figures included the ramp connections to the Intercounty Connector. The costs for the two-lane parkway were expected to be approximately \$96.8 million with grass shoulders and \$99.9 million with paved shoulders. These costs did not include the extensions to the Intercounty Connector, since they were not recommended. With the ramps included, the costs were expected to be approximately \$113.7 million with grass shoulders and \$117.0 million with paved shoulders. Right-of-way acquisition costs were not included in any of these figures.

AESTHETICS

Four-Lane Parkway

The minimum width of the four-lane parkway from outer shoulder edge to outer shoulder edge is 100 feet, a third of the width of the corridor. In order to achieve a safe and correct horizontal and vertical alignment over rolling topography while providing a sinuous route that fits the landforms and affords good views, it is often necessary that the parkway be aligned off center within the right-of-way. The bicycle/pedestrian route must, at times, directly abut the parkway to permit adequate space for screening the route from the residential areas bordering the right-of-way.

Particularly where the corridor is narrower than 300 feet, yet even throughout its entire length, the grading in each section of right-of-way must be carried out to minimize the impact of the parkway on bordering land uses. At Rockville Pike, Randolph Road is raised in elevation and the entrance to a shopping center is relocated. To achieve an effective site plan, further study is needed. At Veirs Mill Road, where the right-of-way narrows, additional study is needed to show that the right-of-way can absorb the visual impact of the required structures and grading. There remain many difficult site planning, grading, and environmental issues to be resolved.

An alternate section with a variable median was studied to provide a different alignment for the eastbound and westbound roads with a greater separation between them. Such a design would permit extensive plantings in the median. Due to the narrow width of the right-of-way, this alternative was rejected as impractical; greater disturbance of existing natural features would occur. Even with the 10-foot-wide median used in the final preliminary design, it was not uncommon in areas of cut or fill to grade substantially as much as 175-200 feet of the 300-foot right-of-way width.

Two-Lane Parkway

A two-lane parkway in the Rockville Facility right-of-way fits more comfortably into the rolling topography (see Figure 6). The curvilinear alignment flows smoothly, flanked by an independent Class I bicycle/pedestrian path linking existing trail systems. The parkway edges would be graded so that cuts and fills blend into the existing topography, matching its character. There is ample width to screen adjacent residential neighborhoods with new plantings and to save large masses of significant vegetation. It was also recommended that compatible recreational uses be provided in areas of the right-of-way adjacent to the parkway.

The following design criteria for parkway character were recommended:

1. Accomplish regrading with cuts and fills fitting the existing topography with the least disturbance to vegetation cover in a manner consistent with the existing landscape composition or the creation of a new landscape composition.
2. In wooded areas, create an undulating edge starting along the shoulders of the roadway with a variably wide grass strip that extends into gently graded coves planted with understory and small flowering trees.
3. Preserve the pastoral quality of the open areas (originally fields) along the parkway at a number of locations.
4. Retain specimen trees that serve as focal points in the landscape and plant additional specimen trees to enhance landscape scenes or to create rich visual compositions.
5. Maintain or create vistas where appropriate.
6. Install plantings to screen development that is intrusive or detracts from the natural park quality and, conversely, to screen the traffic on the parkway from the view of development, particularly residences.
7. Where noise barriers are necessary, use landforms and planting to the greatest extent possible as means for mitigating traffic noise.
8. Maintain architectural unity and harmony in the parkway structures (i.e., bridges, culverts, walls, noise barriers, guide rails, fences, signs, lighting, etc.) through the use of materials, structural forms, and colors.
9. In constructing interchanges, adhere to the design principles for curvilinear alignment and natural park quality to the greatest extent possible.
10. To reduce mowing needs, maintain open areas as fields of wildflowers, which would require mowing only two or three times a year. (The danger in this treatment is that the fields would quickly revert to shrubs and trees if maintenance becomes lax.)

CONCLUSIONS

Two-Lane Parkway More Suitable

In our study, we developed designs for a two-lane parkway and four-lane parkway (with opposite roadways separated by a median) in sufficient detail to determine their engineering feasibility. Both parkways are possible for the Rockville Facility; however, they differ in their purpose and in their impacts. Clearly, the four-lane parkway is primarily a transportation facility, although it is limited to cars and buses. The two-lane parkway, on the other hand, is primarily a park road connecting a number of parks; only secondarily does it serve transportation.

Although the Rockville Facility was originally acquired three decades ago for a transportation route, the right-of-way today is a park-like corridor that threads itself



Figure 6. Sketch of two-lane parkway with grass shoulders.

through built-up neighborhoods of residences and commerce. Consequently, it is perceived as a park, with its varied woods, fields, and streams. Further, the Rockville Facility connects three parks; visually, parts of the right-of-way appear to be parts of those parks.

Our study caused us to judge the two-lane parkway a more suitable and better use for the Rockville Facility than the four-lane parkway for these reasons:

1. The narrower section of the two-lane parkway (45 feet versus 100 feet) requires less clearing and grading, resulting in less disturbance to the natural features.
2. The narrower section results in a more flexible alignment, horizontally and vertically, for both the parkway and the bicycle/pedestrian paths, an alignment which fits the topography and leaves ample space for securing the roadway from neighboring residences.
3. The traffic noise is significantly less due to lower volume of traffic, lower design speed, and greater area of space within the right-of-way for noise attenuation.
4. The alignment avoids the floodplain to a greater extent, leaving more of the floodplain undisturbed, and provides ample space within the right-of-way for infiltration of stormwater runoff and flow attenuation.
5. The bicycle/pedestrian path fits more effectively into the right-of-way as an independent system joining or intersecting the parkway alignment at important intersections or stream crossings.
6. The concept of a parkway as a two-lane road linking a series of three regional parks while also accommodating a major

east-west traffic flow is more appropriate, given the confines of the 300-foot-wide right-of-way, than a major four-lane transportation artery.

Park Concept: Public Policy Implications

One policy issue which must be addressed is land ownership, which has been studied by the MNCPPC staff. Three types of ownership were detailed. Seventy-nine acres in the right-of-way were bought by MNCPPC's Advance Land Acquisition Revolving Fund (ALARF) for transportation purposes. If this acquired land is not used for transportation, but is used instead for a park, MNCPPC may need to reimburse ALARF. The State Highway Administration (SHA) owns 215 acres, bought for transportation purposes. Should this land not be needed for transportation, under current law, the land must be offered to the original owner for the amount originally paid by the State. The remaining 55 acres are privately owned and would be expensive to purchase, yet the cost must be evaluated against the intended use and future value.

To realize a goal of a linear park running the entire length and width of the Rockville Facility would require creative legislative action in order to use state and privately owned land for recreation purposes. One way in which the park might still be considered to have a major transportation function would be to incorporate a commuter bicycle route meeting applicable county, state, and federal standards. This function might satisfy the designated transportation use of the state-owned land, while reinforcing the park concept addressed in the study, and being eligible for funding from the state and federal governments. A bikeway corridor in a park might provide a relief valve for traffic congestion at an economical cost, with minimal impacts on environmental quality.

If the state does not consider the bikeway concept viable as a transportation function, then the creation of a linear park in the entire right-of-way will require legislative changes to permit acquisition of the state-owned lands purchased for transportation purposes. The acquisition of private land would also be needed. Although these acquisitions may be expensive, their cost should be balanced against the permanent value of preserving valuable recreation and forest resources for future generations.

Public Reaction

Mounted renderings of the vegetation maps, the conceptual park plan, the two-lane and four-lane parkway plans, and related sections were presented at a public open house at a local junior high school in November 1988. Further presentations and discussions of all the alternatives occurred at two meetings of the Montgomery County Commissioners and the Transportation and Environment Committee in December and January, 1989. The issues of impacts on wetlands and floodplains became more important as these meetings progressed, since the additional bridge structures and the loss of wetlands, even if they could be re-created in desirable locations, were so expensive. The Commissioners finally voted to recommend that the most environmentally sensitive areas of the right-of-way be set aside as parkland, and they acknowledged that a transportation use of other portions of the right-of-way, despite the cost, might still occur. This recommendation was legislated recently. However, it is difficult to imagine how a transportation use could be implemented for either end of the right-of-way. Nevertheless, there is not a consensus to dedicate the entire corridor as parkland.

At all meetings, public officials and citizens were surprised at the costs of either parkway option. Also, general opposition to any parkway option was voiced by most

citizens in attendance, who have spent a generation living adjacent to the corridor. Even though no condemnation of housing or other existing structures was required to implement either parkway option, the strength and organization of the opposition was considerable. Legitimate concerns about costs and environmental impacts were being expressed.

One can only imagine the public outcry had the right-of-way crossed through existing residential or commercial development. In Atlanta, for example, a decades-long battle has still not quite ended over plans, almost implemented, to wedge a new commuter parkway through existing residential neighborhoods, destroying many fine homes in the process. Andrew Young, the mayor elected in part because of his opposition to the parkway, now supports it wholeheartedly. The site includes the library and study center of his ally, former President Jimmy Carter.

Sadly, in the case of the Rockville corridor, some issues are still in limbo. What will be the final use for the remaining portions of the right-of-way not designated for park land? Neither the county nor the state seems interested in managing additional park lands. If a transportation use, no matter how limited, is not implemented, the state, barring a change in the law, may sell the lands to the original owners, opening the way for more residential development in areas with limited and congested transportation facilities. There has been no decisive political leadership to resolve the problems.

As a case study, the Rockville Facility has been unusual in thoroughly evaluating the proposed corridor for *both* a transportation and a recreation land use. In addition, it has been a valuable experience for both the client and the consultant to appreciate the public policy implications of evaluating a transportation land use opposed by most members of the surrounding community but favored by many planners and government

officials concerned about long-term transportation issues in the region.

The reactions to the study emphasize the difficulties to be expected when transportation facilities are proposed in congested urban or suburban areas that present difficult site planning and environmental challenges. The costs will be high, and there will be significant opposition by various groups affected, no matter how well-designed a facility is planned. The era is past when readily buildable land for

transportation or residential use can easily be found. The placement of major transportation uses through existing, rights-of-way of varied and difficult character will require as a beginning step a time-consuming, yet necessary study. If the results are favorable, the long, arduous process of environmental assessment will continue. The eventual outcome will be hard to predict, since the impacts, costs, and politics of the process will often be so complex.

A Visual Quality Assessment Along the Blue Ridge Parkway for the East Roanoke Circumferential Environmental Impact Assessment

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INTRODUCTION

The Virginia Department of Transportation (VDOT) is proposing the construction of an East Roanoke Circumferential highway (ERC) to connect Interstate 81 northeast of Roanoke to U.S. Route 220 southeast of the City of Roanoke. In October 1987, VDOT retained Harland Bartholomew & Associates, Inc., to prepare preliminary engineering studies and an environmental impact statement (EIS) for this proposed highway. An aesthetics and visual quality assessment was included in the technical studies required for the EIS. This paper summarizes the section of the assessment that focuses on potential visual impacts to that portion of the Blue Ridge Parkway located within the study area.

Approximately 15.85 miles of the Blue Ridge Parkway are located between U.S. Routes 460 and 220. This part of the parkway bisects over one-third of the ERC study

window. The Blue Ridge Parkway is the most visually significant resource existing in the ERC study area. The Blue Ridge Parkway within the study area was constructed during the 1960s. The scenery from this part of the parkway includes ridgeline views and views into the Roanoke Valley. Designed as a linear highway for motorists, the Blue Ridge Parkway is a federally owned facility operated by the National Park Service. The recreational purpose of the parkway is to provide visitors with a sense of the natural beauty of the area, including the cultural heritage associated with the rural environment. Visitor centers and trails are located adjacent to the Blue Ridge Parkway, with many visitor exhibits and facilities to encourage use as one travels along the roadway.

METHODOLOGY

The methodology employed for the visual

assessment, which identifies potential impacts along the Blue Ridge Parkway, was tied to the overall planning of East Roanoke Circumferential highway corridor. The tasks were divided into three categories: data collection, analysis, and review. Although the tasks required within each of these areas were sequential, they are interrelated.

The initial site survey and data collection were conducted as a multidisciplinary team evaluation of the study corridor. Subsequent to the initial site survey, a series of interviews, a literature search, and data collection were conducted. As a part of the data collection, information was gathered from the National Park Service land use maps of the Blue Ridge Parkway. This information was used to identify potential viewpoints from the parkway. A preliminary analysis was then conducted using the data collected during the initial site survey and from aerial photography and topographic maps. The results of the preliminary analysis were presented as part of the evaluation process, which included team members with varied expertise. The team evaluation resulted in the selection of potential candidate build alternates.

Subsequent to the selection of the potential candidate build alternates, a detailed survey of the entire length of the parkway was conducted to study the viewpoints that may be present during the leaf-off season. This survey identified each view by a code number, description, and parkway location. Viewsheds identified on the parkway land use maps were verified. Photographs were taken at all viewpoints; field-of-vision angles were recorded for potentially impacted areas; and the composition of each view was identified. Each of the recorded viewsheds was mapped on 1" = 1000' scale aerial photographs of the study area. An analysis of this information identified and quantified the anticipated impacts for each of the potential candidate build alternates.

Following the analysis, several coordination meetings were held with various agencies, including the National Park Service. A series of public information meetings was also held, during which comment on the potential candidate build alternates was solicited. These comments and the evaluation by team members resulted in modifications which were incorporated into the candidate build alternates selected for further study.

After the selection of the candidate build alternates, another field survey was conducted to complete the field data sheets and compare the winter views with a leaf-on survey. Additional panoramic photographs were taken of significant vistas. Based on the additional data collected and the selected candidate build alternates, the viewshed information was updated on the 1" = 1000' scale aerial photograph. Visibility of the ERC alternates from the parkway was verified at critical locations using cross-section analysis. The locations of the candidate build alternates were also indicated on panoramic photographs for those alternates located less than 1000 feet from the parkway. Preliminary engineering data were then incorporated into perspective renderings illustrating the two parkway crossing locations along the ERC. Potential impacts were summarized for each candidate build alternate. The analysis, impact summary, and viewpoint field data sheets were incorporated in the Aesthetics and Visual Quality Memorandum prepared for the Virginia Department of Transportation in July 1988.

VISUAL IMPACTS IDENTIFIED

The aesthetic and visual impacts of the Blue Ridge Parkway have been categorized as high, medium, or low level. A high-level impact is generally located within 1000 feet of the existing Blue Ridge Parkway, while a low-level impact is one in which the East

Table 1.
Summary of Visual Impacts

	Line 6	Line 7	Line 8	Line 9
Total impacts	12	13	5	4
Direct impacts of other significant views	3*	2*	3*	1*
1000 feet or less to impact	3	6	1	2
1000 feet or greater to impact	7	7	1	2
Overlooks impacted	5**	2**	2**	1**
Parkway crossing	1	1	1	1
Winter views	4***	0	0	0

Line 6

* 19R-Longitudinal Encroachment, 20R-Parkway River Crossing.

** 4 of the overlook impacts at Stewart Knob and river overlook are winter views.

*** These 4 impacts are greater than 1000 feet.

Line 7

* Read Mountain and Roanoke Mountain Overlooks.

** Read and Roanoke Mountain Overlooks.

Line 8

* N & W Overlook, Parkway bridge over Glade Creek, and Roanoke Mountain Overlook.

** N & W nad Roanoke Mountain Overlooks.

Line 9

* Roanoke Mountain Overlook.

** Roanoke Mountain Overlook.

Source: Harland Bartholomew & Associates, Inc., July 1988 and Revised November 1988.

Roanoke Circumferential alternate can be seen, but at a distance over 100 feet.

Potential impacts for each of the alternates have been assessed for each of the parkway viewpoints identified. A summary for each alternate and the no-build alternate are described below and summarized on Table 1.

Alternate 6

A total of 12 potential visual impacts have been identified from the existing Blue Ridge Parkway to the ERC Alternate 6. Of these 12 impacts, one involves a parkway crossing in the same approximate location as the existing Route 617 overpass of the parkway. Access from this crossing location to the

Blue Ridge Parkway is not planned.

Other significant viewpoints include the viewpoint located at the Blue Ridge Parkway crossing of the Roanoke River and a 0.3-mile portion of the parkway north of this river crossing. The eastward view from the Roanoke River Bridge would be impacted by the ERC bridge crossing the Roanoke River. A longitudinal encroachment of the ERC on the Blue Ridge Parkway would also occur just north of the parkway river crossing. The overlook at Roanoke Mountain will also be impacted by Alternate 6. This view is approximately one mile from the overlook, but due to visitor frequency at the overlook, this impact is considered significant.

Two of the remaining impacts are

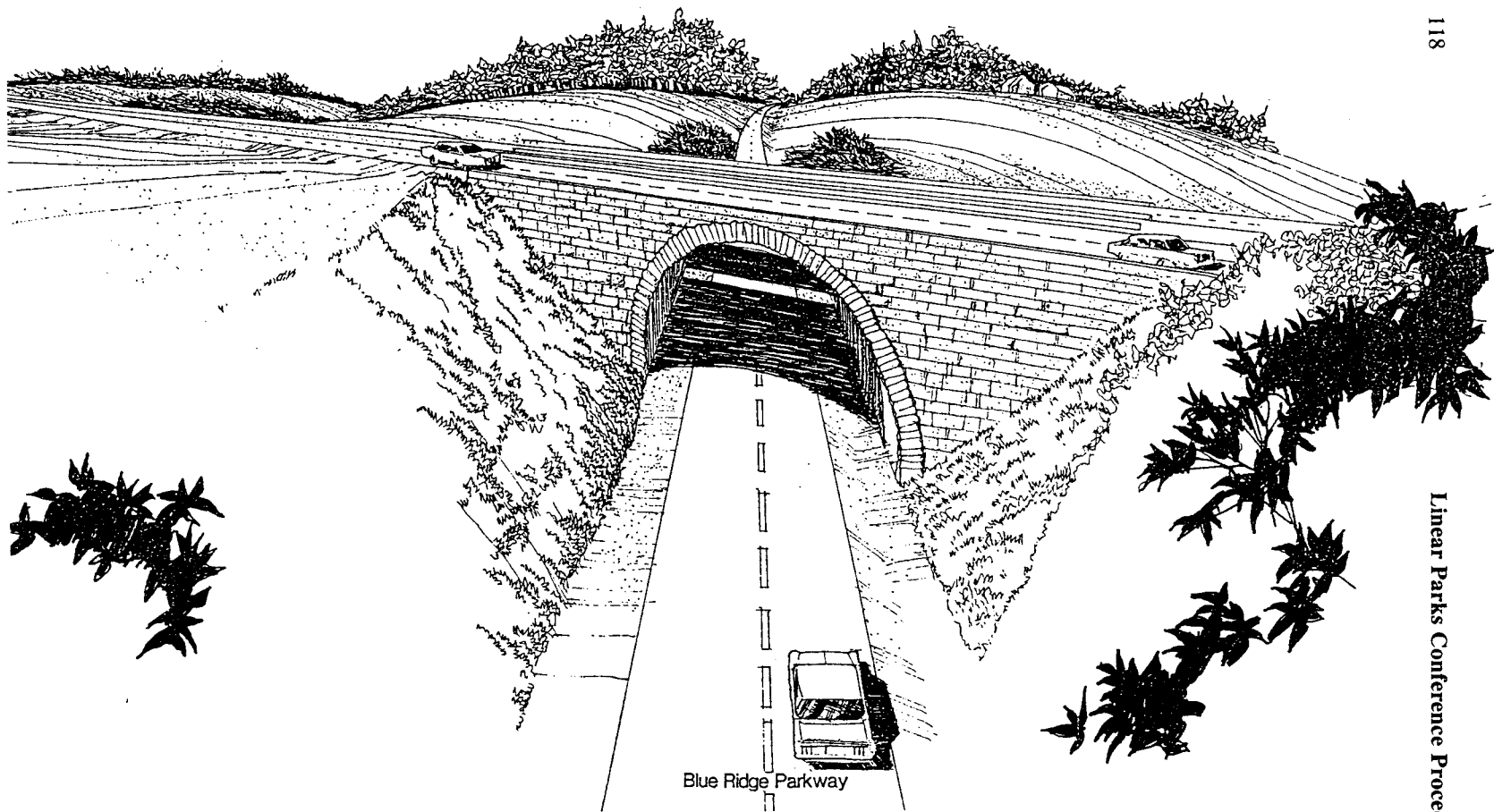


Figure 1. Blue Ridge Parkway crossing Alternates 6, 7, and 9.
Drawn by Randall Gilbert.

located less than 1000 feet from the existing parkway, and seven impacts exist at a distance greater than 1000 feet. Four of the seven viewpoints impacted at a distance of greater than 1000 feet are winter views only.

Alternate 7

Thirteen potential view impacts have been assessed for the ERC Alternate 7. The same crossing of the existing Blue Ridge Parkway is used for Alternates 6 and 7. Access from this crossing location to the Blue Ridge Parkway is not planned. Alternate 7 is located some 700 feet from the Read Mountain Overlook. Six other impacts have been located more than 1000 feet from the parkway. The view from the Roanoke Mountain Overlook to Alternate 7 is 1000 feet; however, the overall visual character of the valley could change with development adjacent to the proposed ERC, thereby exacerbating the visual impact.

Alternate 8

Five viewpoints identified on the existing Blue Ridge Parkway will be impacted by the ERC Alternate 8. Of these five impacts, three are situated at significant view locations. These locations include the Norfolk and Western Overlook, the bridge crossing Glade Creek, the railroad, and Route 738, and the Roanoke Mountain Overlook.

The East Roanoke Circumferential is planned to cross the Blue Ridge Parkway in the vicinity of these viewpoints approximately 800 feet to the south. Access from this crossing location to the Blue Ridge Parkway is not planned. The two remaining views of the Blue Ridge Parkway from ERC Alternate 8 are at a distance greater than 1000 feet. Again, one of these views is from the Roanoke Mountain Overlook and, as stated earlier, represents significant potential visual impact.

Alternate 9

Alternate 9 results in the fewest visual impacts to existing Blue Ridge Parkway viewsheds. The alternate was based on a request made by the National Park Service. A total of four visual impacts have been assessed, including the crossing of the parkway at Route 617. Again, access from this ERC crossing location to the Blue Ridge Parkway is not planned. The most significant viewpoint, and the only overlook impacted by the proposed Alternate 9, is the Roanoke Mountain Overlook. Alternate 9 would be visible from the overlook at a distance greater than 1000 feet, but the potential for change in the character of the surrounding landscape throughout the valley would be present due to this proposed ERC location and development that may follow its construction.

No-Build Alternate

The no-build alternate was also addressed as part of the visual assessment. Visual impacts are not anticipated for this alternate. Future development adjacent to the existing Blue Ridge Parkway right-of-way will continue to present possible visual impacts to the parkway, however. As a result of growth, average daily traffic volumes may increase from commuters using the parkway under the no-build scenario. The relocation of the Blue Ridge Parkway and the use of the existing parkway as an ERC alternate may be studied as a future alternate.

RESULTS OF THE ASSESSMENT

Each proposed candidate build alternate directly impacts federal properties associated with the Blue Ridge Parkway. The linear nature of the Blue Ridge Parkway prohibits the avoidance of a crossing for a circumferential highway planned east of the Roanoke Valley. Because all of the ERC

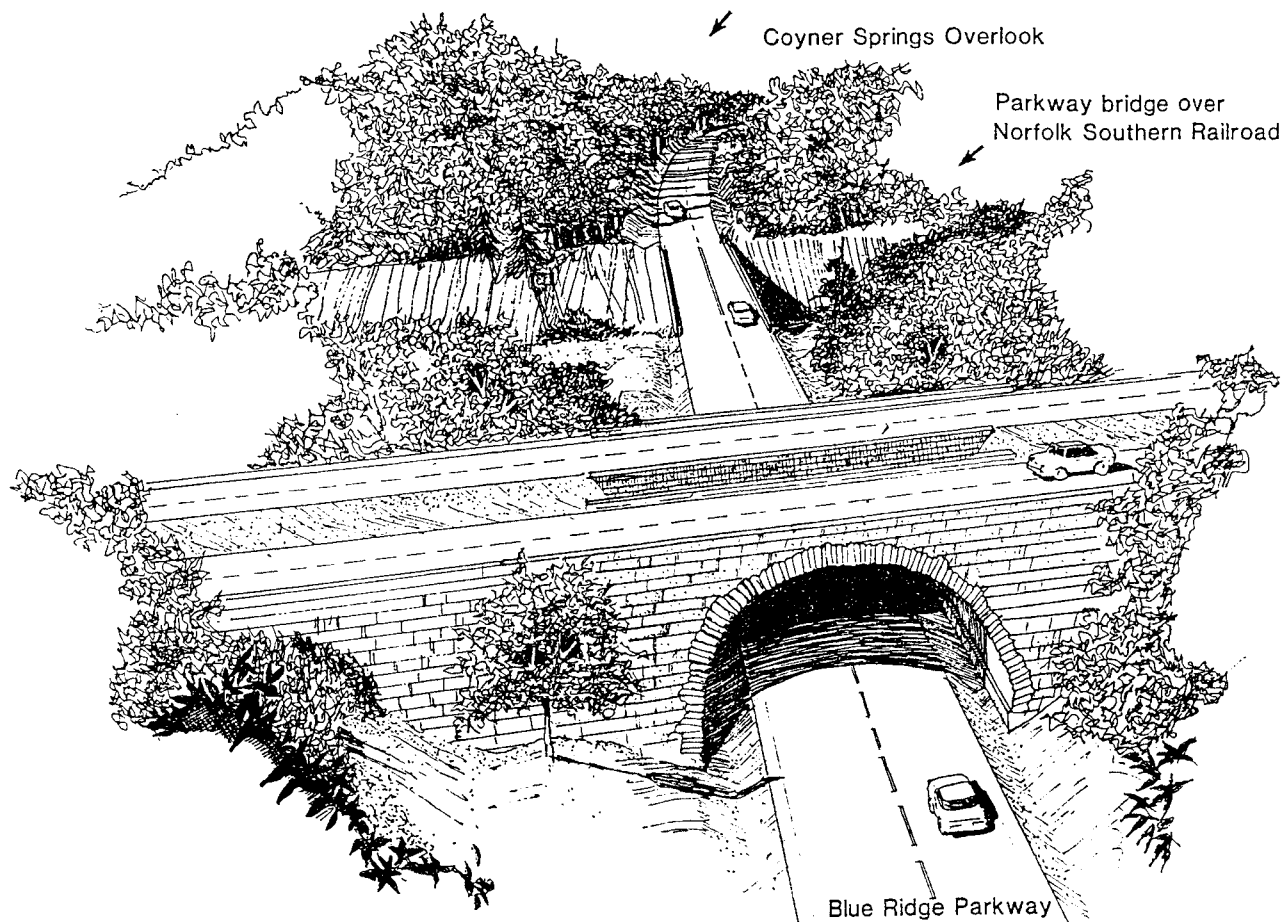


Figure 2. Blue Ridge Parkway crossing Alternate 8.
Drawn by Randall Gilbert.

alternates involve a taking of federally owned recreation park lands, a separate 4(f) section is required in the full environmental impact statement. Avoidance opportunities and mitigation techniques were discussed in this 4(f) section of the EIS.

The potential ERC crossings of the Blue Ridge Parkway were of particular concern during the visual assessment. Initially, an attempt was made to plan ERC crossings at a location below the existing grade of the Blue Ridge Parkway. The topography of the area, however, precluded this approach. The crossing location for Alternates 6, 7, and 9 was chosen because of the existing overpass of Route 617. The location of the crossing for Alternate 8 was chosen to permit a rapid climb in elevation across Stewart Knob. Although the crossing itself is in a low area and is not visible from long distances, the viewshed impacts associated with the ERC's climb over Stewart Knob are significant.

ERC Alternate 8 directly impacts the Blue Ridge Parkway at the crossing of the ERC and the parkway just north of parkway milepost 108. Approximately 4.3 acres would be impacted due to this crossing. This crossing is planned as an overpass some 25 feet above the existing parkway elevation. The ERC would be a four-lane facility approximately 150 feet in width at the crossing, and the proposed bridge would be similar in design to the crossing proposed for Alternates 6, 7, and 9 (Figure 1). Figure 2 shows the location of the Alternate 8 crossing of the Blue Ridge Parkway.

The proposed crossings of the ERC and the parkway would not inhibit the function and use of the parkway and its adjacent park lands. However, if visual impacts are perceived by visitors as severe, the enjoyment of the parkway experience would be diminished. Steps taken to ameliorate visual

impacts of the ERC highway construction would lessen the chance of decline in parkway visitation due to the loss of quality scenery, but the visual scarring predicted along the Stewart Knob mountainside as viewed from the N & W Overlook would be a permanent source of criticism by parkway visitors.

The visual impacts at sites less than 1000 feet from existing Blue Ridge Parkway viewpoints should be mitigated using a combination of vegetative screening and earthwork along the parkway and/or adjacent to the proposed ERC alternate. Adjustment in the parkway's easement may be appropriate in locations such as the viewshed impact caused by Alternate 7 at the Read Mountain Overlook.

In cases where visual impacts occur at a distance greater than 1000 feet, the severity of the visual impact is generally diluted by the increase in space and by the limited interaction between the viewer and the viewed area. Efforts to mitigate the visual impact of a proposed highway directly adjacent to that facility become more important as the distance decreases between the viewer and the view. For example, it may not be feasible to eliminate the viewpoint at an overlook; however, visual impacts can be minimized by avoiding extensive highway cut areas, increasing landscaped areas adjacent to the right-of-way, and controlling adjacent development resulting from highway construction.

Since a candidate build alternate has not been selected from among Alternates 6, 7, 8, 9, and the No-Build Alternate, site-specific mitigation techniques and recommendations for the impacted Blue Ridge Parkway view points discussed in this assessment will be incorporated in the Final Environmental Impact Statement.

REFERENCES

- Hornbeck, Peter and Garland Okerlund, Jr., *Visual Values for the Highway User: An Engineer's Workbook*. U.S. Department of Transportation, Federal Highway Administration, Washington, DC. 1973.
- Jones, Grant, et al., *Visual Impact Assessment for Highway Projects*. U.S. Department of Transportation, Federal Highway Administration, Published by American Society of Landscape Architects, Washington, DC. 1979.
- Litton, R. Burton, Jr., *Forest Landscape Description and Inventories: A Basis for Planning and Design*. Research Paper PSW-49, USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California. 1968.
- Litton, R. Burton, Jr., *Landscape Control Points*. Research Paper PSW-91, USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California. 1968.
- USDI, National Park Service, Blue Ridge Parkway, Land Use Maps. 1968.
- USDI, National Park Service, Blue Ridge Parkway, Plans for Projects 1M1 and 1M2—Revised as constructed. 1967.

Desert Greenway: Kuwait's Waterfront Park

John W. Bright, Committee on Roads and Linear Landscapes, International Federation of Landscape Architects

INTRODUCTION

Desert and greenway—the words seem contradictory and mutually exclusive. And yet in the desert sheikdom of Kuwait a new greenway has emerged.

At the headwaters of the Arabian Gulf a city developed and a maritime-oriented Islamic culture flourished among its Arab inhabitants. Now dramatically changed to a petro-industrial society, Kuwait is restoring its historical relationship with the sea. A magnificent greenway, sheathing the urban interface with the sea, promises to be without peer in the world.

Only fifty years ago Kuwait was a British-protected sheikdom of pearl divers, seafaring traders, and fishermen. A few Bedouins roamed its harsh desert. But development of the country's petroleum resources, the world's third most abundant in a New Jersey-sized nation, changed all that. Today, 30 years after independence, Kuwait is a wealthy, modern state.

PLANNING THE GREENWAY

The first master plan for Kuwait City, produced in 1951 on the eve of the oil boom, contained no specific provision for the waterfront, but conceived the present expansive city webbed by broad motorways, in sharp contrast with traditional Arab urban form. Ten years later, an early waterfront plan proved infeasible. The next plan, in the early '70s, boldly envisioned a national park along more than half of Kuwait's 300-kilometer shoreline. It further proposed that the city's waterfront be developed for recreational and open-space purposes. A

coastal highway was built, separating city from gulf, creating a linear zone of derelict land between highway and sea.

In 1975, the city invited five international firms to submit design proposals for this "new, special edge to the city, reflecting its importance as a cultural, commercial, and international centre, at the same time serving to remind of its historical waterside connections." The concept presented by Sasaki Associates with Ghazi Sultan, a local architect, and the Kuwaiti Engineers Office was selected. The jury found their organic, less structural approach most reflective of Kuwaiti culture. The plan respected Kuwait's coastal dynamics and landmarks and laid out a practical, incremental, and economic implementation strategy.

The Sasaki team was commissioned to elaborate on its concept. Consultants in beach processes, geotechnics, irrigation, sedimentation, plant materials, and recreation analyzed data on the physical, biological, and cultural environment. Certain design influences were extreme—salinity of soils and irrigation waters, limited materials pallet, geotechnical anomalies, and severe summer weather (temperatures regularly exceed 120 degrees F).

In this master plan, the park complemented the coastal highway, the spectacular Kuwait Towers, the Gulf, and city. The coastal highway has been integrated into the greenway itself by changing the highway's character from that of an urban expressway to one more parkway-like. It is reminiscent of the George Washington Parkway's relationship to the Potomac River, but in a far different cultural and physical setting.

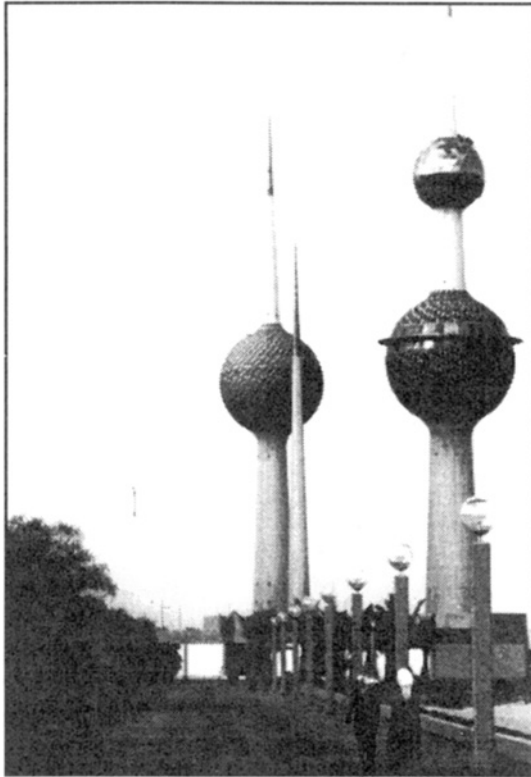


Figure 1. The modern state of Kuwait, with Kuwait Towers on right.

The plan divided the greenway into ten zones, each of which related to an adjacent neighborhood. Seven of these zones included “major use areas,” where activities and special facilities such as beaches, thematic playgrounds, and marinas were concentrated. Additionally, these zones and major use areas formed the basis for construction phasing.

DESIGN ELEMENTS

The master plan went beyond concepts. “Modular components”—paved surfaces, furnishings, architecture, boating facilities, amphitheaters, and playgrounds—are defined. These design components establish a

continuous character for the 21-kilometer-long greenway. The plan sets standards for site planning, creates vertical interest through land sculpturing, and offers scale definition in the relatively flat and featureless landscape. Materials emphasize naturalness, simplicity, and the harsh environmental conditions. The color, tone, and texture of these materials further complement this sense of naturalness and the country’s desert character.

Although the variety of locally available materials is limited, local materials dominate the park and are emphasized to reduce dependence on imports. While many of the park’s manufactured furnishings are imported, the most costly imported component was armor

stone for the extensive riprapping. This was barged from neighboring United Arab Emirates since local materials could not meet rigid specifications. Enormous quantities of sand for beach nourishment were trucked in from the nearby desert rather than dredging the Gulf bottom due to environmental considerations, mainly the potential harm to Kuwait's notable and historic fisheries.

Plantings form a major unifying element throughout the greenway. Although the variety and supply of plant materials are limited (50 trees, shrubs, and ground covers, most of them introduced), there is a sense of richness, simplicity, and hardiness. And this effect is produced in the face of severe sandstorms, virtually non-existent rainfall, and poor soils. Plant concentrations provide

focal points, emphasize major use areas, and facilitate maintenance. Plants reinforce and define the linear character of the greenway's singlemost dominant physical element, the coastal highway.

Water as a play object and art form is restrained for practical and obvious reasons—it is a precious commodity in Kuwait. Moreover, the Gulf's expansive waters dominate the scene, providing amply for boating, swimming, fishing, and other water recreation.

In the desert night, Kuwait is a sparkling city of lights, and Waterfront Park adds a soft transitional edge to the dark Gulf. Lighting is artfully accomplished and greatly facilitates use during pleasantly cool evenings. Site graphics and signs are well



Figure 2. Coastal Highway

coordinated, consistent in design, restrained in number, and appropriately sized.

WATERFRONT PARK IN KUWAITI CULTURE

At a cost of \$170 million (U.S.), two phases of the five-phased park have been completed. Continuity from master plan concepts to constructed landscape has been maintained. In addition, a recently concluded agreement with Iraq will greatly augment fresh-water supplies, which are now limited by production from brackish wells and the world's largest desalinization plants.

The greenway is cherished by Kuwait's diverse population, where foreign nationals outnumber Kuwaitis. The nation's wealth has led to substantial increases in mobility, leisure time, early retirements, and large families. Its population is exceptionally young, with 40 percent of the population under 20. Waterfront Park's timely response to this phenomenon is a design that includes extensive playgrounds.

Through its design, Waterfront Park's greenway bonds city to sea, and blends simple elements, materials, and forms into a matrix of quality and permanence. It provides a model for urban greenways and linear parks.

REFERENCES

- Al-Mutawa, Subhi Abdullah. *Kuwait City Parks: A Critical Review of Their Design, Facilities, Programs and Management*, KPI and Kuwait University, London: 1985.
- Bright, John W. "Mixing Water and Oil." *Landscape Architecture*, May 1989.
- Bright, John W. and Pan Arab Consulting Engineers. "Assessment of Recreational and Leisure Activities." The Survey & Upgrading of Existing Gardens & Other Open Space, Study Area IV. Kuwait: December 1988.
- "Kuwait Builds \$400 Million Beach." *Engineering News Record*, June 6, 1985.
- "Kuwait Waterfront Project." *Middle East Construction*, February 1979.
- "Kuwait Waterfront Project Design Competition: Report of the Jury." February 5, 1976.
- "Kuwait's Waterfront Revival." *Middle East Architectural Design*. March 1979.
- Sasaki Associates, Inc. *Summary Master Plan*. Master Plan Report, Kuwait Waterfront Project, Volume One. 1977.
- "Urban Waterfronts '84: Toward New Horizons." A summary of a conference in Washington, D.C., September 14-15, 1984.

The Greenway for Tomorrow: Three Case Studies

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PROSPECT

A greenway is a linear park with one or more routes (e.g., pedestrian, equestrian, automobile, waterborne). It is usually joined by a scenic parkway oriented to slow-speed facilities with abutting communities and their non-recreational uses.

The ideal of linear park system, or a mixed-use Urban Greenway as advocated in the President's Commission on Americans Outdoors (PCAO), is not new. It comes out of the nineteenth-century Parks Movement in Europe and the United States. It was given form by Frederick Law Olmsted, Sr., in Brooklyn, Buffalo, Boston-Brookline, and Louisville; by H. W. S. Cleveland in Minneapolis, Omaha, and Providence; by the Olmsted Brothers in the Northwest; and by George Kessler in the Midwest.

The intent of these linear park systems was clearly set forth by H. W. S. Cleveland in 1890 in his proposal for an ambitious 20-plus-mile parkway system for the City of Omaha. Cleveland states:

A moment's reflection will show the superiority of the broad parkway with a tasteful arrangement of trees and shrubbery at its sides and in the centre, for the reason that it provides for the wants of a far greater number of people to whom it is easily accessible from adjacent quarters on either side for its whole length; that it necessarily becomes a thoroughfare in which zest of constant active life, with all its attractive display of dress and equipage is combined with the graceful forms and refreshing verdure of natural beauty; that property on its sides speedily acquires very great value,

whether for residences or the sites of public buildings, hotels or magnificent shops; while no display of wealth in any other form contributes equally to impress strangers with the idea of civic grandeur as such liberal provision for the health, comfort and gratification of residents and visitors alike.

Gone are the days when we eradicated the greenway. In 1910, for example, the Charles River Dam was completed, changing the Emerald Necklace's Back Bay Fens into a permanent fresh water basin. Arthur Shurcliff's plans of the same year document designs for the connection point between the Fens and the Charles River Embankment. The plans were implemented in the next decade, severing gentle pedestrian and parkway connections. The salt marshes of the Back Bay Fens, like New Jersey's Morris Canal, were engineering marvels of their time. The canal, which spanned the state from Phillipsburg to Jersey City, was abandoned and filled in the same decade, in 1912. As with the demolition of historic building treasures in the 1960s and 1970s, we have learned our lessons.

We are reminded again and again in our master planning work with historic parks, parkways, and park systems that these old practitioners were pragmatic visionaries, practical and farsighted. Their ideas were driven by environmental and social concerns that are just as relevant 100 years afterwards. Most of their recommendations are as valid today as then.

This paper will highlight three case studies in which the firm of Walmsley & Company has been involved: Boston-Brookline, Massachusetts; Seattle, Washington; and Baltimore-Howard-Anne Arundel

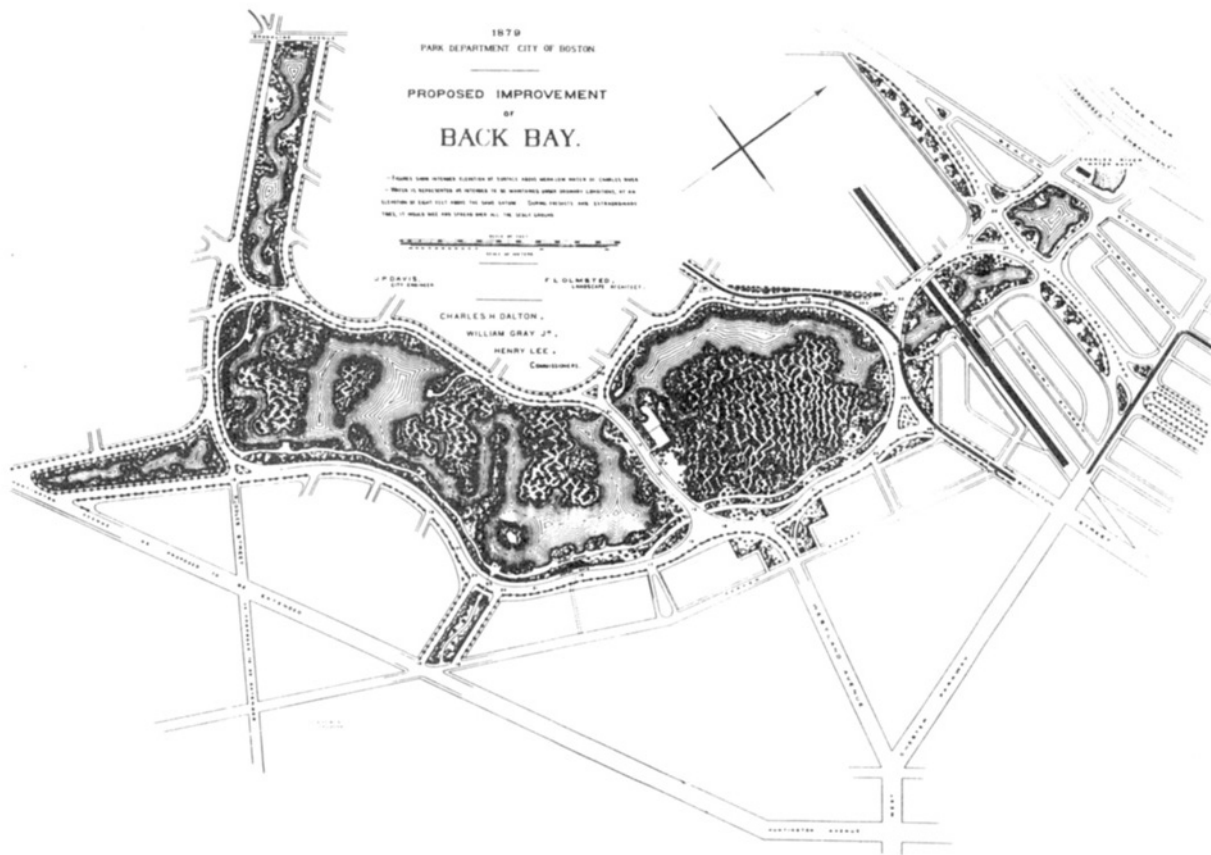


Figure 1. *Back Bay Fens: Proposed improvement of Back Bay. Olmsted, Olmsted, Eliot design; 1879.
(National Park Service, Frederick Law Olmsted, National Historic Site)*

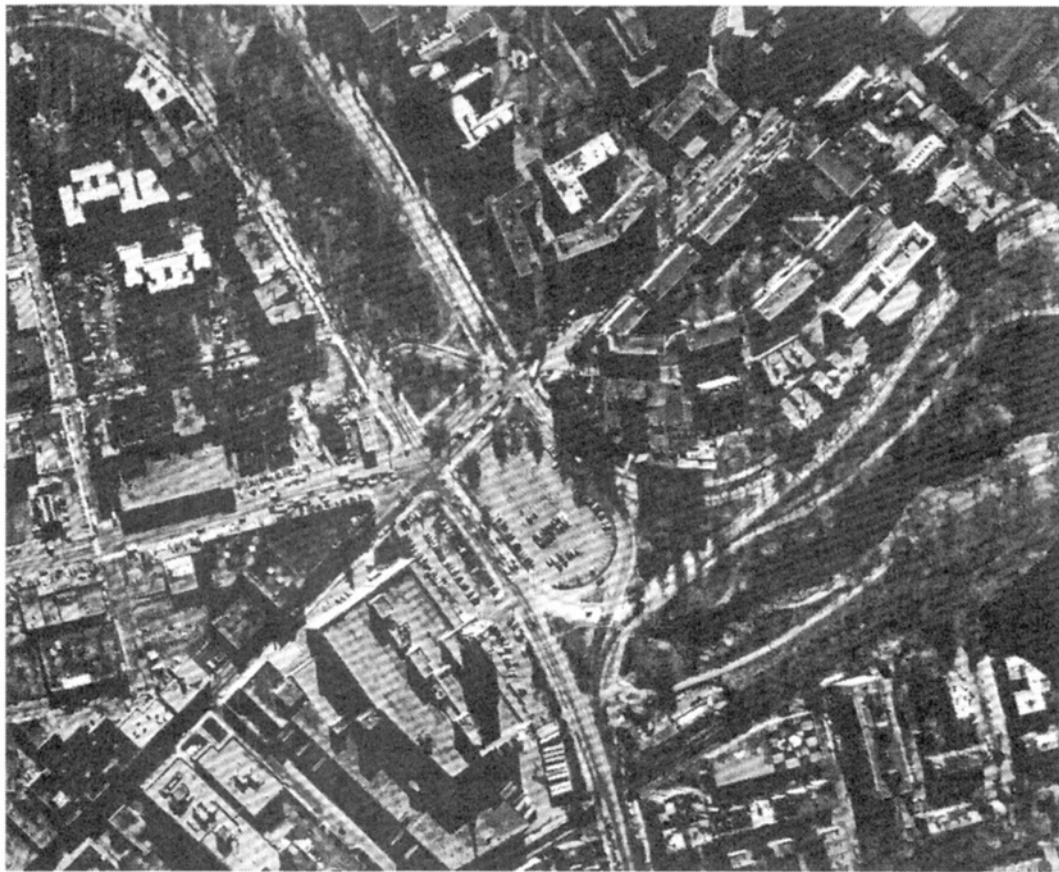


Figure 2. Aerial photograph of Riverway / Back Bay Fens connections and the “Sears Parking Lot.” This is to be returned to “parkland” as part of a new redevelopment package, 1985. (Photo-Metrics, Inc.)

Counties and Baltimore City, Maryland. The projects range from rehabilitation and restoration to new greenway corridors. Although linear parks programs may now place a greater emphasis on public/private partnerships and community outreach, the overall guiding principles are the same. These principles are clearly stated by George Kessler's "A Park System for the City of Cincinnati" (1907):

- To relieve unsightly conditions resulting from the neglected and untenable property which exists throughout the limits of the built-up sections, by reasons of the natural rugged formation of the land, and which will result in some of the most attractive park properties that have been planned.
- To preserve as far as possible the unrivaled natural scenery and delightful views found in every portion of the outlying districts.
- To connect into a comprehensive system all of the park properties thus selected together with those now existing, for both easy access into each property and for pleasing communication from one to another.
- The result is a plan forming a system of parks and parkways connecting the existing park properties, and providing for a number of new park lands and their connections.

CASE STUDY 1: The Emerald Necklace Parks, Boston-Brookline, Massachusetts

Background and History

The overall goal established by the Massachusetts Department of Environmental Management for the Olmsted Historic Landscape Preservation Program is the

creation of a long-term rehabilitation framework which will guide future planning, management, maintenance, and preservation action through increased public awareness of the Olmsted legacy and through the funding of major capital improvement projects that will describe the rehabilitation process, further increase public support for the historic parks and parkways, and act as a catalyst for generating project funds.

The Olmsted Program is intended to preserve the surviving original elements of historic parks and to safeguard the parks' historic design intent, use, and appearance. Its projects are intended to re-establish Olmsted's naturalistic landscapes of river, meadow, and woods within the urbanizing areas of expanding cities and to encourage a broad range of activities in the parks.

The four Emerald Necklace Parks—the Back Bay Fens, Riverway, Olmsted Park, and Jamaica Pond—were designed and constructed in the 1880s and 1890s under the direction of Frederick Law Olmsted, Sr., John Charles Olmsted, and Charles Eliot with the assistance of engineers, horticulturists, and a large work force from the City of Boston and the Town of Brookline.

Originally, the system was designed as a river park interconnected by the Muddy River, a tributary of the Charles River. As a system of open space, the Emerald Necklace was intended as a refuge from the city, providing freedom and escape into a natural world of water, meadows, and woodlands. Its strongest characteristic was its continuity—the river and ponds formed out of a marshy creek.

Its promenades were meant to be an unbroken "pleasure route" following the meandering of the river and connecting the city with neighboring communities and the countryside. Parkway run along all four parks on the Boston side; they are coupled with the Arborway, at the southern end of Jamaica Pond, which connects with the

Arnold Arboretum. As in Olmsted's other parks, the pathways were for pedestrians, the ride for equestrians, and the drive for carriages. Unlike his typical country parks, however, the Emerald Necklace was linear. Its parkways, bridle paths, and walks were compressed into a narrow corridor. They connected city and suburb, and although they were an integral part of the river park, general traffic could use them. Olmsted hoped that non-park traffic would not create a conflict. He stated: "The indirect course of the park-way following the river bank, would prevent [its use] for purposes of heavy transportation. It would thus, without offensive exclusiveness or special police regulation, be left free to be used as a pleasure route."

Over the last forty years, increased automobile traffic and eradicated parkway connections (e.g., within our study area at the Sears Parking Lot and outside at the Arborway between the Arboretum and Franklin Park) have begun to separate the parkways from the parks. One of the greatest challenges will be to reunite them.

Action

A joint venture to balance historic intent and contemporary use requirements for the Emerald Necklace was initiated. Issues were understood in a historic context and developed into a restoration plan that integrated a functional maintenance and management strategy. The project was a three-step process.

The first step was a comprehensive master planning process for these historic landscapes to update all earlier, relevant data and integrate them with new data, providing an objective basis for analyzing options, identifying priorities, and guiding the preservation of the four parks and their associated parkways.

The second phase is soliciting a broad range of community viewpoints about the parks and parkways. User surveys (both on-site and telephone), public forums, and open

discussions lead towards a preservation and management program that can be designed to gain the endorsement of the vast majority of park users and public officials.

The third phase is preparing a comprehensive plan that insures that all proposals are scrutinized in relation to time, and aim toward the longevity of all actions. The objective is efficient, cost-effective management and maintenance of existing, restored, rehabilitated, or reconstructed elements of the parks and parkways.

With archaeologists, landscape historians, and surveyors contributing to the process, the Phase 1 work resulted in a comprehensive master plan for the restoration and management of the parks. This product includes Early Action Projects as well as First Phase Projects. Over \$2 million in projects are now in various phases of implementation.

CASE STUDY 2: Lake Washington Boulevard, Seattle, Washington

Background and History

The Seattle Department of Parks and Recreation commissioned a private consultant team for the restoration planning, design guidelines, and first-phase construction of Lake Washington Boulevard. The 9.2-mile Boulevard lies along Seattle's eastern edge, predominantly along the shores of Lake Washington, linking the University of Washington (at the north end) with Seward Park (south end). Along the length of the Boulevard are a variety of residential neighborhoods, including Montlake, Harrison, Madrona, Leschi, Mount Baker, and Lakewood-Seward Park.

This scenic parkway is a key feature in a fifty-mile system of "Parks, Boulevards and Playgrounds" proposed to the Seattle Park Commissioners by the Olmsted Brothers in 1903-1908. The firm remained involved as consultants to the Commission for the

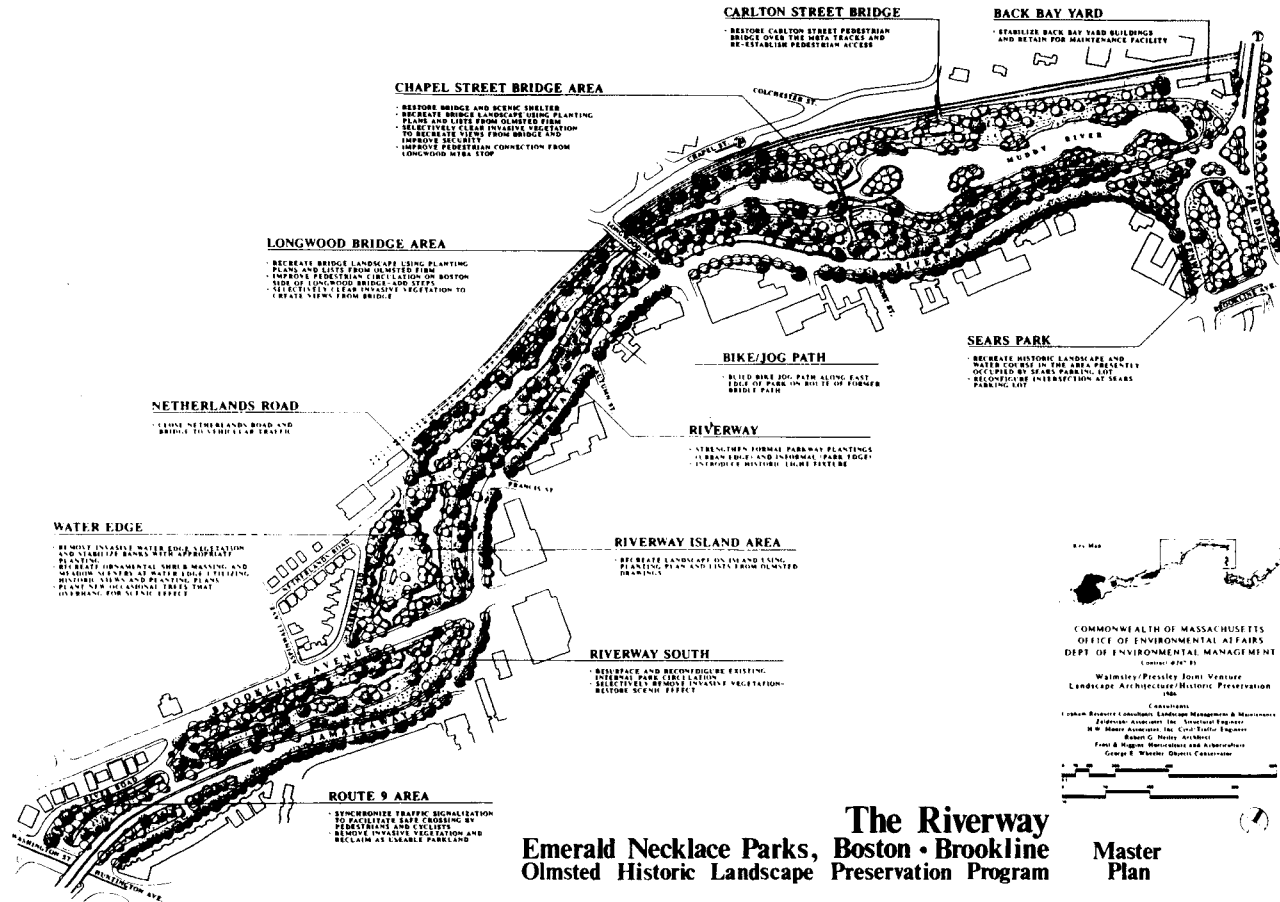


Figure 3. Master Plan for the Riverway. Note Sears Park, as discussed in Figure 2.
(Walmsley/Pressley Joint Venture, 1988)

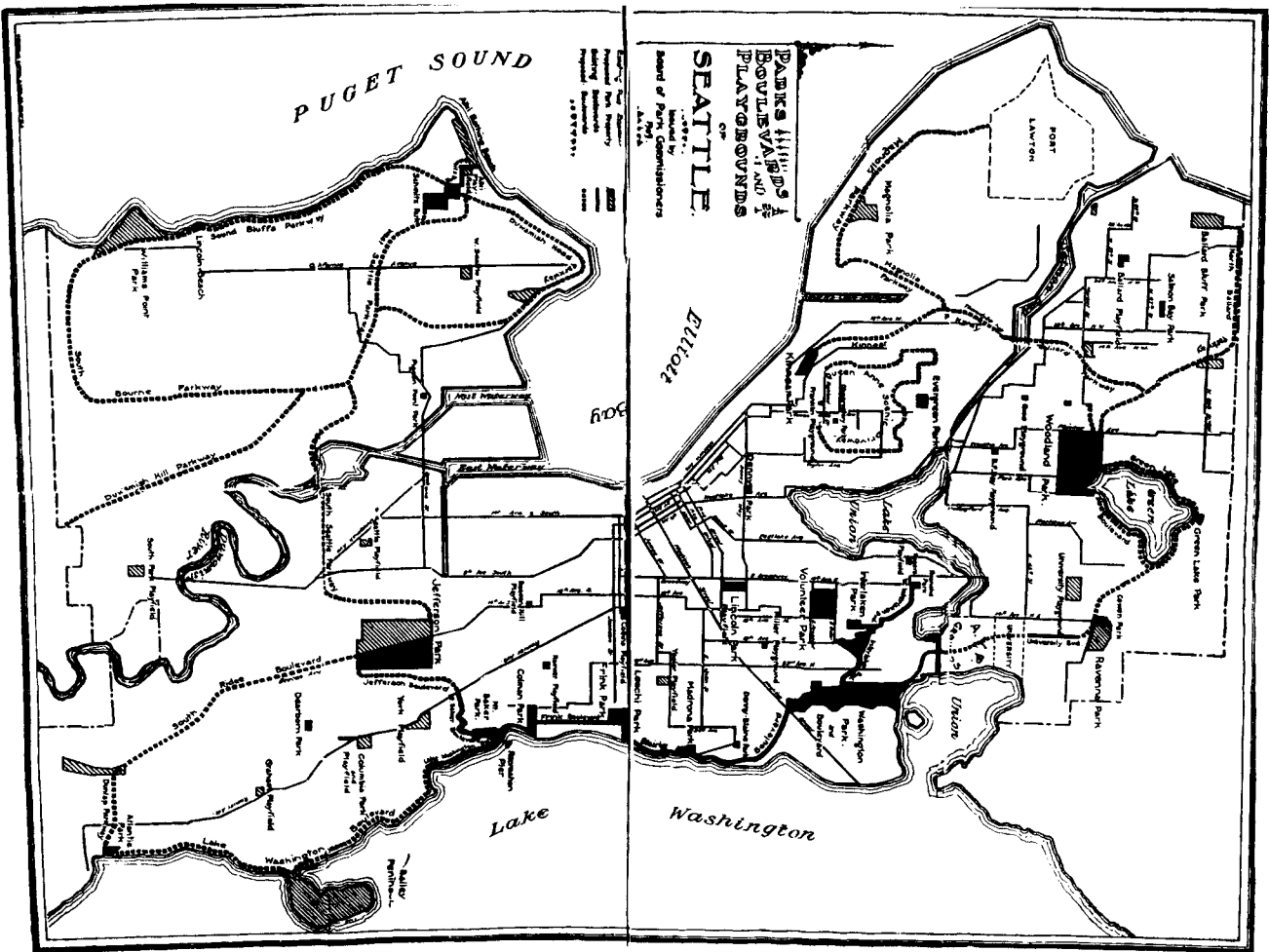


Figure 4. Parks, Boulevards, and Playgrounds of Seattle, 1909. (Parks Commissioner's Report)

next thirty-five years. Lake Washington Boulevard was intended to be a central link along a "charming scenic drive among native trees" connecting several other boulevards and major parks. It was also to be the visual and physical access to the city's major water features, including Puget Sound, Lake Washington, and Lake Union.

The original intent of the boulevard (which J. C. Olmsted defined as a "formal street of uniform width, usually 200 feet") was to pass through the forested areas and have a parkway image (which he defined as an "informal landscape garden of natural scenery"). The firm, however, realized that expansion was imminent and decided that a boulevard treatment would be more appropriate. Today the character of the Boulevard is best described as predominantly lake edge (47%), followed by park and forest (30%), and residential (23%).

Action

The objectives of the project were to understand the historic intent of the Boulevard as a pleasure drive and recreational resource and regain its historic integrity and imagery, to enhance scenic views and vistas, to provide for a range of recreational opportunities, and to resolve encroachment problems while improving function, maintenance, and management capabilities.

The inventory and analysis phases documented historic alterations, functional problems, environmental issues, scenic views and vistas, and it described technical materials and construction solutions for the parkway's drainage, structural, and site elements. Alternate plans and designs were tested against the objectives of historic intent, functional needs, environmental protection, scenic preservation, technical appropriateness, and cost. From these evaluations conducted with community representatives, a set of design guidelines

for the rehabilitation of the parkway was determined.

The priorities assigned to the recommended proposals have guided the selection of the initial capital projects. This process has insured that the first improvements are based on a long-term plan for the Boulevard's restoration.

CASE STUDY 3: The Patapsco Greenway; Baltimore-Howard-Ann Arundel Counties, and Baltimore City, Maryland

Background and History

The Patapsco River is the dividing line between Baltimore County to the north and Anne Arundel County to the south. The greenway includes approximately twelve miles of river frontage and stretches from the mouth of the Patapsco River in the northeast at Reed Bird park and Southwest Area Park, to Belmont Conference Center in the west, from the neighborhoods of Halethorpe and Rosemont in the north, and to Baltimore Washington Airport in the south.

The Patapsco River lies within the Patapsco State Valley Park, under the jurisdiction of the Maryland Department of Natural Resources (DNR). The DNR, along with the Maryland Department of Economic Development, represents the client group. Within the study area, the park covers approximately 2,000 acres on both sides of the Patapsco River within a 11,000-acre, twenty-seven-mile park.

Beginning around 1900, the Executive Committee of the Municipal Art Society began to pursue a comprehensive plan for the City of Baltimore. On May 6, 1902, the Society engaged the Olmsted Brothers to generate a plan that eventually became a report entitled *Development of Public Grounds for Greater Baltimore*. This document was to be "a careful general

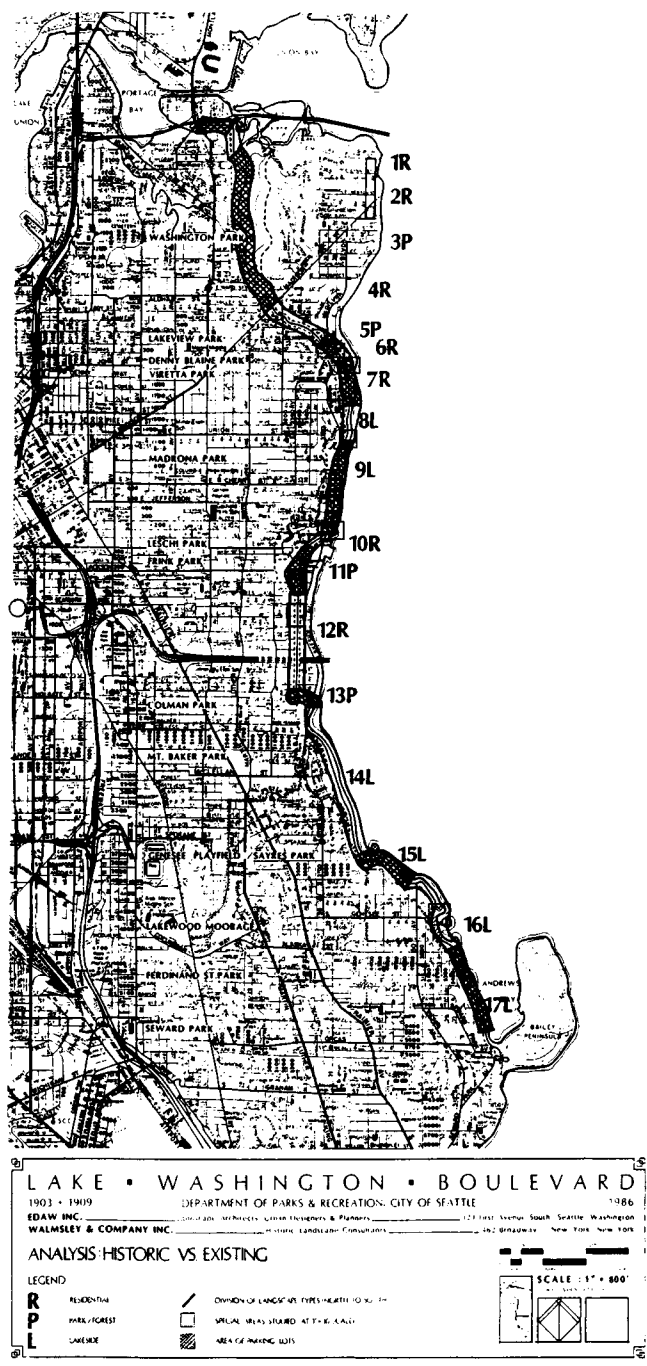


Figure 5. Lake Washington Boulevard, analysis of residential, park, forest, and lakeside character areas. (EDAW/Walmsley & Company, 1986)

examination of the suburban portion of the City of Baltimore and such adjacent parts of the country as may seem to have a close organic connection with it, and for a report stating their advice as to the treatment of that area in respect to the reservation of park spaces and main lines of communication and the general treatment of the same. . . .” The report, published in 1904, proposed linking large existing parks such as Druid Hill (the nation’s third oldest), Clifton, Montebello, and Patterson. The development plan contained a route of new stream valleys with a hierarchy of parks and parkways, including Gwynn and Jones Falls, Herring Run, and the Patapsco River.

Much of the plan was not realized. Testimony to the soundness of this clearly planned system, however, is provided by the recent ASLA Community Assistance Study, entitled the “Revitalization Plan for the Wyman Park Drive and 33rd Street Corridor,” and by the DNR plan for the Patapsco River.

Action

The Patapsco Greenway parallels and, in part, includes abutting lands that represent opportunities for securing major high-visitation, regional, and national recreation facilities that are not normally provided in a state park but could be supported by the urbanizing Baltimore-Washington corridor; connecting existing state, county, and city parks into a continuous system; creating a scenic parkway; and reclaiming disturbed sites.

Final alternative design concepts, a market demand and economic analysis, and implementation strategies are currently under review. Following their resolution, a refined final plan and implementation strategy will be presented publicly.

CONCLUSION

The reason one sees little of the Urban Greenway idea today is the difficulties attendant to its realization. In the rapidly urbanizing hinterlands surrounding American cities, the escalating price of land and the “leap frogging” that occurs with high-speed freeways, plus multiple small jurisdictions and the lack of a strong unified public policy, have made the coordinated planning of greenways and high-growth corridors extremely difficult.

There is hope, however. Today greenways are being designed or rediscovered with newly found alliances and constituencies. Public-private partnerships, with a strong community participation and advocacy component, have been recommended in cities including New York (the Brooklyn-Queens Greenway), Chicago (using historic boulevards in neighborhood revitalization), and Baltimore (the Patapsco Greenway and the revitalization plan for the Wyman Park Drive and 33rd Street Corridor).

Tomorrow’s greenways must aim high. They must sensitively accommodate higher-speed automobile traffic (many were originally designed as carriage routes), maintain and enhance scenic qualities, be ecologically sound as well as maintainable, balance varied uses (automobiles, bikers, joggers, and sometimes horses), create optimum pedestrian access to abutting public parklands, and reduce the impact of commuter traffic (both volume and hard-surface area). As Anne Whiston Spirn states in the September 1989 issue of *Landscape Architecture* magazine: “An appreciation for past contributions is essential if we aspire to truly innovate, not merely reinvent.” Today’s new greenways or their restored or rehabilitated predecessors must meet this challenge.

BIBLIOGRAPHY

- City of Chicago, *Life Along the Boulevards: Using Chicago's Historic Boulevards as Catalysts for Neighborhood Revitalization*, January 1989.
- Cleveland, H. W. S., undated letter to the Board of Park Commissioners of the City of Omaha, ca. 1890.
- EDAW, Inc. with Walmsley & Company, Inc., *Lake Washington Boulevard: Working Papers*. May 1986.
- Fox, Tom, and Anne McClellan, *The Brooklyn-Queens Greenway, A Design Study*. 1988.
- Hilderbrand, Gary, *Back Bay Fens Historic Landscape Report*. June 1986.
- Johnson, George, *The Challenge, New Jersey Natural and Historic Resources News*. Summer 1988, p. 1.
- George E. Kessler & Co. Landscape Architects, *A Park System for the City of Cincinnati*. Report of the Park Commission to the Honorable Board of Public Service of the City of Cincinnati. 1907.
- Olmsted Brothers, *Development of Public Grounds for Greater Baltimore*. 1904 (reprinted 1987, Friends of Maryland's Olmsted Parks & Landscapes).
- Olmsted Brothers, *First Annual Report of the Board of Park Commissioners*. Seattle, Washington. 1884-1904.
- Olmsted, Frederick Law, "Suggestions for the Improvement of the Muddy River." *Sixth Annual Report to the Board of Commissioners of the Department of Parks for the City of Boston for the Year 1880*.
- Spirn, Anne Whiston, "Prospect," *Landscape Architecture*. September 1989, p. 112.
- State of Maryland, Department of Natural Resources, *Patapsco Valley State Park Master Plan*. Adopted March 1979.
- Walmsley & Company, Inc., *Working Paper One: The Patapsco Greenway*. July 1988.
- Walmsley/Pressley Joint Venture, *Emerald Necklace Parks Master Plan*. 1989.

The Uncompahgre River Valley: A Recreation Master Plan

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INTRODUCTION

The exploration and initial development of the semi-arid region of Colorado was concentrated along rivers. However, as towns and cities grew, the waterfront was deemphasized, with most commercial and civic activity focusing on Main Street or on the railroad. This left the river, in many cases, as an unsightly dumping ground for abandoned cars and industrial waste. Recently, a new awareness has emerged, however, and the recreation and tourism industry has become an important element in the economies of rural western Colorado. Communities are beginning to recognize the river corridor as an important natural amenity and, in the pursuit of economic viability, a focal point for the development of cultural and recreational resources for an entire region.

The Uncompahgre River Master Plan began as an idea for a trail that would connect the city of Montrose to the new Ridgway Reservoir. This concept was initiated by a group of privately organized citizens known as the Uncompahgre Riverway Group, Inc. Recognizing their limited resources, they applied for, and were awarded, assistance from the Colorado Initiatives Program for rural economic development. The Landscape Architecture program in the Graduate School of Architecture and Planning at the University of Colorado—Denver was enlisted to provide planning and design services.

During the preliminary review, it became apparent that the major focus of this project should be to revitalize the river corridor as a natural system and as a vehicle to connect communities and potential recreation resources within the valley. It was at this point that the Uncompahgre River Master

Plan came to fruition as an effort to revitalize a river, not just in one community but along its entire length through three counties and seven towns. It looks beyond immediate hurdles, such as ownership, to maximize the full recreation potential of the valley by celebrating its rich cultural heritage.

PROJECT APPROACH

To create a master plan that is not generic but responds to context, a thorough understanding of the site's character and history is necessary. Recreation planners and landscape architects, in particular, need to understand the capacity of the natural environment to support human activities. The first step in this process was a site inventory and analysis where students surveyed existing environmental, cultural, and historical characteristics. The study area encompassed approximately two miles on either side of the river and extended 60 miles from the town of Ouray to the confluence with the Gunnison River at the town of Delta.

The next phase, program development, utilized user profiles and identified program needs. Consideration of both residents' and visitors' recreation needs was important to the process. A list of different recreation activities and their physical site requirements was compiled. Initial design development began at this stage as teams of students discussed design elements that would be required for different types of recreation facilities. The program development phase made it possible to develop a value system, which rated the ability of the valley's physical and cultural characteristics to accommodate specific recreational uses. Levels of inherent

suitability were mapped within the study area for unmanaged recreation, managed recreation, and historical interpretation.

With a firm understanding of the site characteristics, the user, and the valley's potential for different recreation activities, the students were prepared to combine the data into two conceptual master plan alternatives. The first recognized land ownership as a constraint; the second did not. Once the maps were complete, they were presented to the Uncompahgre River Group for input. Their comments, in combination with discussions among the students, resulted in the refinement of the plan to final form. As an integral part of the Master Plan, design guidelines were developed.

This master plan is not meant to be a final blueprint but to offer ideas and direction for recreation planning along the Uncompahgre River corridor. Because the plan considered natural and cultural conditions along with user needs and requirements, it will provide a strong framework through which future decisions can be made.

THE INVENTORY AND ANALYSIS PHASE

Study Area Overview

The Uncompahgre River runs northwest through western Colorado from its headwaters in the San Juan Mountains at an elevation of 12,000 feet. By the time the river reaches the Gunnison River, 60 miles to the north, it has descended some 7,000 feet. The valley has not been densely settled and remains rural and agricultural. Montrose, the county seat, is the regional business center, with a broad range of services for the valley. Other communities exist, but they are smaller and less economically diverse.

Although this project focused only on the river valley, its environmental characteristics are drastically transformed as the river flows from the alpine setting of Ouray down

to the broad agricultural bottom lands. Thick timber stands vegetate the steep valley sides near Ouray, while further north, the valley widens and the river, bordered with dense stands of cottonwood trees, meanders through cultivated fields. The river cuts through the sandstone layers of the Uncompahgre Plateau, north of the town of Ridgway, providing a strong sense of enclosure. Below Ridgway Reservoir, the valley widens again and continues to broaden. At lower elevations, vegetation changes to scrub pinon-juniper. Field agriculture replaces ranch land pasture, and the network of irrigation canals which traverse the valley is especially evident.

The towns along the river reflect their histories and their settings. The varied character of these communities begins to suggest the abundant and diverse possibilities for recreation along the river corridor. Added to the natural resources is the rich cultural heritage that has resulted from the crisscrossing paths and the settlements of different cultures. Ute Indians, missionaries, traders, trappers, soldiers, miners, railroaders, ranchers, and farmers have all left their marks along the Uncompahgre. This cultural heritage offers excellent recreation opportunities as examples of man's efforts to tame the West.

Natural Systems

The Uncompahgre River flows through a geologically diverse area of southwestern Colorado. The lower sections of the river north of Ridgway are part of the plateau region, which typifies western Colorado. The region is characterized by deep canyons and ravines which cut through mesas, buttes, and plateaus. This distinctive quality of these landforms is derived from the varied erosion rates and brilliant coloring of the different horizontal layers of sedimentary rock. Further south, the Uncompahgre Valley is part of a large volcanic field that extends across

southwestern Colorado, Utah, Arizona, and New Mexico. Volcanic activity formed the San Juan Mountains, which glaciers and streams carved and sharpened into their present form. This volcanic activity created a network of hot springs, and it isolated areas where minerals such as silver and gold would form. As it travels on its 60-mile journey, the river thus provides a story board illustrating the geologic forces that created the Rocky Mountains.

The microclimate in the Uncompahgre River Valley is greatly affected by elevation changes along the river. At lower elevations, below 7,000 feet, the valley has an arid climate with an annual precipitation of 10 inches or less. Winters are mild, with occasional snowfall. Above 7,000 feet, the climate changes dramatically, with an increase in precipitation and cooler temperatures. Ouray, for example, averages 23 inches of rain and 140 inches of snow each year.

The Uncompahgre is a perennial river with a 100-year floodplain. It is fed by a series of perennial tributaries. Stream flows have seasonal fluctuations, with snow melt providing the bulk of the surface water. Flows are greatest during the spring and early summer run-off periods. Flooding can occur during spring snow melt and from isolated thunder showers in the late summer. During the summer and early fall, surface water is diverted from the main river channel into a canal system that supplies water to cultivated fields. Irrigation is the lifeblood of the agricultural community, as this way of life could not exist on natural precipitation. Historically, the river was polluted with heavy metals and had a high mineral content from the mine tailings located in the upper reaches of the valley. The Ridgway Reservoir was recently constructed, with a capacity of 80,000 acre-feet of water. Aside from recreational uses, the reservoir functions as a settling area for heavy metals and mineral sediments, resulting in greatly improved

water quality below the dam.

The vegetation of the Uncompahgre River Valley takes on unique visual characteristics which respond to these changing environmental conditions. Everything from desert shrubs to alpine plants can be found. However, for the purposes of the master plan, broad vegetative zones were identified and mapped. The vegetation along the river banks and within the floodplain consists of dense stands of cottonwood trees and riparian shrubs. From the confluence of the river to Colona, cultivated fields and grasslands dominate. Sage grassland areas begin at 4,900 feet to 5,500 feet, with greater concentrations of sage on steeper slopes. Continuing south, the river valley begins a rapid transformation to pinon-juniper vegetation. Their deeper green and greater massiveness make them visually more dominant than the sage, particularly during the winter months. At 8,500 feet, a more subtle transition to the mixed woodland occurs. Within this zone there are pockets of spruce and fir occurring on north-facing slopes and along the river banks. At Ouray, above 9,500 feet, the spruce-fir vegetation dominates throughout. It is within this subalpine zone that the greatest diversity of vegetation types occurs.

Five species of big game mammals inhabit the Uncompahgre River Valley: mule deer, elk, black bear, mountain lion, and bighorn sheep. The river otter was at one time native to the Uncompahgre River Valley. Pollution from mining wiped out the population. Recently, otters have been reintroduced to the Gunnison River, and there have been sightings along the Uncompahgre. The Uncompahgre Valley is also home to a significant eagle population. Golden Eagles are year-round residents. The Northern Bald Eagle winters in the valley from November to April.

The river above Ridgway Reservoir does not support a fish population because of

pollution from mining operations. The reservoir, on the other hand, is a major fish habitat. The remaining stretch of the river below the dam has good water quality but poor fish habitat due to the instability of the floodplain's gravel alluvium that makes up the stream bed. Generally, wildlife is more diverse along the river valley from Montrose south, due largely to the extensive farming and grazing further north which has eliminated native habitats. The character of the valley also plays a major role. Terrestrial wildlife is associated with habitats that occur at higher elevations, and steeper, more rocky conditions.

Wildlife is an important component of the Uncompahgre River Valley experience. Hunting, fishing, and watching wildlife are among the diverse opportunities. Understanding and interacting with wildlife is important for tourists and local residents. The broad diversity of wildlife habitats and humans' effects on them are important from an interpretive and educational standpoint. In this light, a recreation master plan should integrate wildlife into a complete recreational package and maximize it to the fullest extent.

The assessment of the landform and visual resources for the Uncompahgre River corridor was undertaken not only to identify opportunities for aesthetic appreciation of the natural landscape, but also to identify where opportunities to interpret natural and cultural history exist. It was necessary that the process chosen to perform this task produce, in the shortest time, a product related directly to landscape design and recreation programming issues. For this reason, it was decided to use what was, for the most part, an objective description of gross landscape elements (landform, land use) while taking into account factors of view-shed distance and viewer's position.

For the Uncompahgre River Recreation Master Plan, it was important to consider the relationship between river characteristics

and the location of adjacent access roads and abandoned railroad right-of-way. Nine separate, distinct valley cross sections were identified, each requiring a different design approach. Each of these valley units was further divided into small river character segments. These segments are differentiated by the dominant land uses adjoining the river. Finally, with each land-use type the associated stream bed pattern of the river was indicated as straight, channeled, meander, or braided.

Cultural Systems

Humans in the Uncompahgre Valley can be traced back to hunter-gatherer tribes who inhabited the plateau regions of western Colorado as long as 10,000 years ago. Since those early days, people from many different populations have found their way to the valley. From the early adventures of explorers and trappers to later conflicts between native people and incoming white settlers, the valley's history is rich and varied. Whether they came to settle or were just passing through, many left their trace.

The Ute Indians' first arrival in the valley was around 1300 A.D. They traveled across the mountain regions of Colorado following seasonal food supplies. Water was a critical component of life and, with natural springs being sacred to the Utes, this river valley came to be an important place in their nomadic journeys. The name "Uncompahgre" means "natural hot springs" in Ute. Little evidence of their early communities has been found along the river, but archaeological sites exist on the higher slopes and plateaus, particularly near hot springs.

The first white men to come to the valley were Spanish explorers and missionaries searching for a safe inland route from Santa Fe to the missions in California. In the Uncompahgre region, they employed Ute guides. In the last years of the eighteenth

century and the beginning of the nineteenth, trappers began to find their way to the Uncompahgre River. In 1858, gold was discovered near Denver and the gold rush began. The growth and excitement that accompanied the first prospectors into the San Juan Mountains in the 1860s would irreversibly change the area from a remote river valley to a booming frontier settlement.

A second rush occurred in 1886 when the Denver & Rio Grande Western Railroad reached Ouray. The arrival of the railroad where only burro pack-trains occurred before allowed for profitable mining of low-grade ore for the first time. It also established Ouray as a major town, with services for mining operations and settlers. Mining has continued on and off as part of the region's economy since the turn of the century, depending on market cycles of mineral ores.

The gold discoveries which brought prosperity to the mining towns of the San Juan Mountains did not bode so well for the Utes. Between 1860 and 1880, conflicts between Utes and whites escalated as white settlers' claims of Ute lands expanded. A Ute reservation that included the Uncompahgre area was established in 1868. Chief Ouray of the Uncompahgre Utes used negotiation and diplomacy to keep relative peace in the valley, but new treaties continued to reduce the size of the Ute reservation. The pressures of the mining boom were too much. Chief Ouray and his people lost the sacred mountains and hot springs of the upper Uncompahgre Valley. The Ute-Removal Act established a reservation for the Utes in Utah on the Uinta Reservation.

Farming and ranching developed as white people flooded into the valley to claim new land. By the 1880s, ranching was booming. Cattle were moved from high summer ranges down into the valley for the winter. Montrose became a big shipping point for sending beef to the east. Ranchers introduced sheep into the valley, and Delta

eventually became the center of sheep ranching. In 1882, the Denver & Rio Grande Western Railroad (D&RGW) brought rail service to the Uncompahgre River. The towns of Montrose and Delta were established; Olathe was soon to follow. Ridgway became an important railroad intersection in 1891 when a line was extended from Ridgway to Telluride. As the mining boom declined, the rail links south of Ridgway became less economical. In 1951, the lines to Telluride and to Ouray were abandoned.

When irrigation was introduced, the valley was transformed into fertile cropland. The sandy soils of the western mesas supported fruit trees, and from the 1880s to the 1910s, the fruit industry boomed. Competition from northwestern states has since reduced the viability of fruit farming, but many orchards still remain. Recent economic hard times have affected the farming industry although crop diversification, marketing techniques, and more efficient methods are now being explored as ways of bringing agricultural prosperity back to the valley.

Tourists, the most recent group to discover the valley, are making their own impact as businesses and towns try to capture their dollars. The Uncompahgre Valley is well suited for recreation. The moderate climate in the river valley, especially at lower elevations, allows for year-round outdoor activity, while the mountainous regions in Ouray County support both winter and summer sports. The towns in the river valley have managed parks and sports facilities. Delta and Montrose have existing trail systems that could be tied into a larger plan. In Ouray, a hot springs pool is a valuable resource for both residents and visitors. Two state parks provide water-related activities for the valley. The main transportation routes, US 50 and US 550, parallel the river, running north and south. Smaller county roads and unimproved canal maintenance roads cross

the valley. Another major transportation system is the railroad. Although it was abandoned south of Montrose in 1976, a 100-foot railroad easement still exists in some places.

Land ownership is an important concern for any master planning effort because of its potential impacts on development. For this project, an exhaustive study of individual parcel ownership was not done. Instead, public ownership and private ownership were used as two broad categories in the inventory. Much of the public land, which makes up about 20 percent of the study area, is already being used or could be used for recreation. The Bureau of Land Management (BLM) and the U.S. Forest Service have large land holdings in the region. On BLM land, grazing, logging, and mining occur. Hunting and fishing are also allowed on both BLM and Forest Service land. The State of Colorado also owns and manages recreation and wildlife areas.

In summary, human intrusion into this valley is a timeline of the history of the West. This rich heritage, coupled with the natural beauty of the Colorado climate, are what give the Uncompahgre Valley its great recreation potential for tourists and residents alike.

The inventory and analysis phase for the master planning process provided the University of Colorado—Denver students with an opportunity to understand the physical and social attributes of the valley. From the results of their research, a pattern was emerging: changes in geology resulted in changes in elevation, soil, and surficial conditions that in turn affected hydrological and microclimatic conditions that affected vegetation that affected wildlife . . . all of which affected people and how different cultures, over time, interacted with the valley.

These relationships produced different characteristics in different valley segments. From Delta to Montrose, broad floodplains

with open expanses of grassland and fields evoke the rural farming image of generations past. From Montrose to Ridgway the valley is in transition. Farming and cattle ranching are a major element, but their visual impact is dwarfed by the encroaching forest-covered foothills and mountains. Finally, from Ridgway to Ouray, the origins of a river unfold in the rough, jagged mountains of the San Juans. Here, it seems that everything is concentrated and intensified and the earth is unyielding and unforgiving. Exploitation of the valley can only be achieved by cutting and blasting.

It is these three identities that provide the framework by which a master plan can describe how this site's unique characteristics may be utilized to their fullest potential.

PROGRAM DEVELOPMENT

Concurrent with the site inventory phase was determining what uses or programs will best lend themselves to the particular site. The program development phase identified users and user needs. Once this has been accomplished, a "wish list" of suitable program elements for a recreation plan was compiled. The next step was to further explore these program elements in terms of their physical requirements, compatibility with each other, and the design elements necessary for their implementation.

The Users

Because recreation includes many uses, the users for this project will be varied. The project team did not attempt to identify every type of user but instead focused on broad categories. The first group of users targeted was local residents. This group encompassed all ages and a wide range of socio-economic positions. Many of those who have chosen to live in the valley have done so because of the beautiful natural setting, the low

population density, and the rural life-style that the valley offers. Local residents engage in many recreation activities. These activities range from organized sports in the towns to hunting and hiking in the wilderness.

Besides local residents, visitors are attracted to the valley. Some of these visitors are just passing through or stopping briefly while others come to the valley to stay and enjoy its facilities. A current dilemma is that most tourists are attracted to the region by the Black Canyon of the Gunnison. It typically only takes a day or two to visit the canyon, and with limited recreation alternatives, most tourists leave immediately. These visitors include sightseeing tourists, cross-country bikers, and dude ranch guests. As with the residents, a wide range of activity occurs. Ouray, with its historic Victorian architecture and its colorful mining past, is a popular destination for visitors. A comprehensive master plan will serve as a framework to increase activities and further stimulate the tourism industry.

By looking at the respective needs of residents and visitors, a list of program requirements was compiled. The primary need of the local populace is the expansion and enhancement of existing facilities and activities in the valley. For visitors, the primary need is to encourage stop-overs along the highway and in towns by providing a greater quantity and diversity of activities and facilities. Most importantly, residents of the valley would benefit from the development of a coordinated recreation system. Linking existing facilities to each other with trails or roadways would expand access for more people. Trails could also be connected with trails on the Uncompahgre Plateau or trails on BLM and Forest Service land. By creating a recreation master plan for the whole valley, resources would not be wasted by facilities duplication. Residents could benefit from a variety of activities that each town could not afford to provide

by itself. Visitors to the region could be served by having more recreation areas. Both visitors and local businesses could benefit from expanded visitor services along the river corridor.

The program elements defined for these user groups were divided into three major categories: historical interpretation, managed recreation, and unmanaged recreation. The historical category includes historic sites and districts as well as interpretive trails and signs. Managed recreation refers to recreation activities that require built facilities and a certain level of supervision or organization, and unmanaged recreation includes activities that do not require a built facility but could occur on a trail or in a more primitive area.

Physical Site Response

As a starting point in understanding the physical relationship of a use to a site, a list of landscape characteristics that existed on the site was compiled in matrix form and analyzed in terms of appropriateness for each recreation activity. Activities within the historical category tended to be location-specific and therefore were related less to physical characteristics than to historic importance. Locations were rated according to condition, level of importance, and interpretive potential. The matrix reveals, as the inventory map suggested, that there are several important sites and structures with good interpretive potential.

For the other two recreation categories, physical characteristics such as landform, slope, access to population areas, and vegetation cover were correlated to facilities. The matrix shows that managed recreation facilities require open, level land with easy and close access to roads and towns. Many are better suited to areas not heavily vegetated. Unstructured recreation activities can take place in more varied conditions

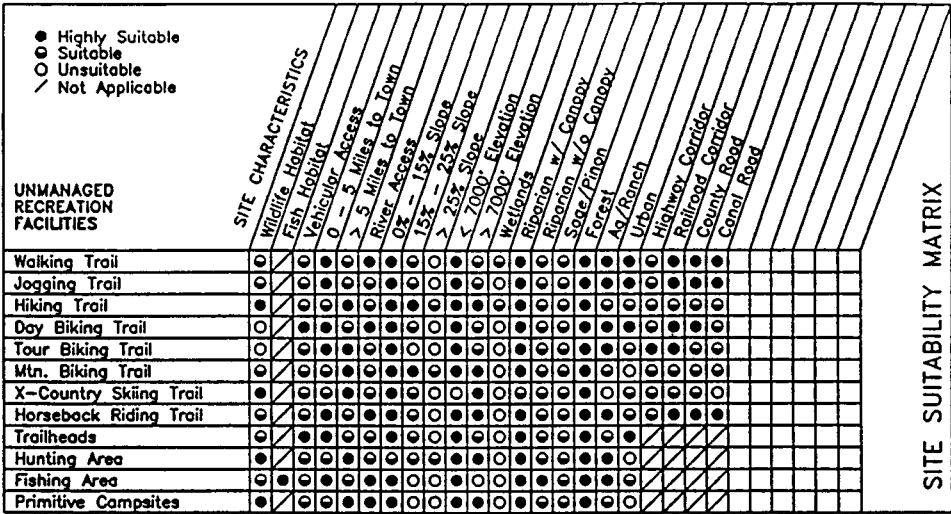


Figure 1. Site Suitability Index.

and terrain, and vegetative cover is a desirable site condition. Access to towns is not as necessary, and existing transportation corridors could be suitable for certain trails.

Use Compatibility

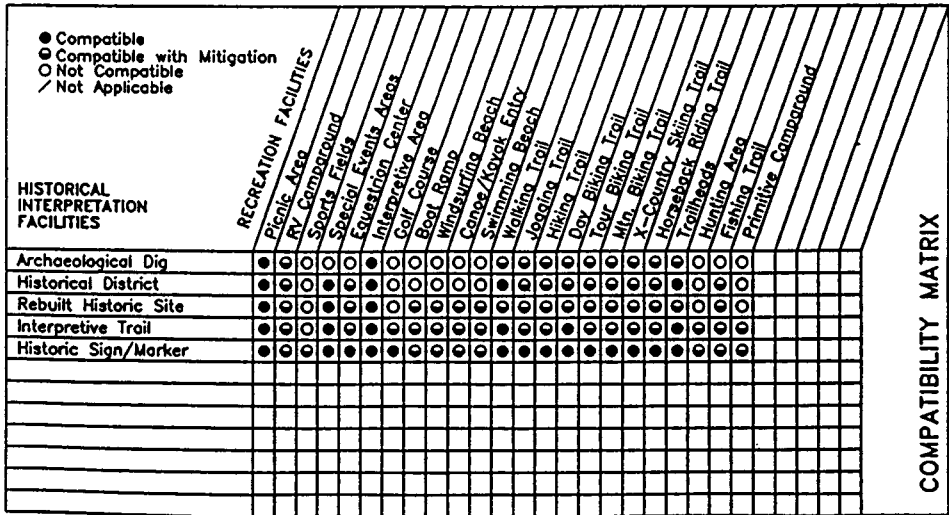
After each recreation facility was examined according to its optimum site needs, the facilities were compared to each other to judge relative compatibility. Each group of students analyzed the effect of activities on each other in terms of limiting or reducing the quality of the recreation experience. In many cases, activities and facilities can be compatible if certain mitigation measures are taken. The matrix suggests that historic sites could be part of certain trail systems but were not as compatible with managed recreation areas. Historical trails could be compatible with certain recreation uses but usually require some kind of mitigation.

Managed recreation facilities often accommodate specific activities. As such, these facilities tend not to be wholly compatible with other uses. Different types of trails were not always found to be compatible with each other without mitiga-

tion. For example, a biking and walking trail could occur in the same corridor as a horse trail, but these uses could not be accommodated on the same trail surface. In general, trails and the unmanaged recreation category were compatible with other recreation and historical facilities. This compatibility is, in part, why these uses constitute the most important program elements in the master plan. Certain unmanaged uses, such as hunting or primitive camping, are not compatible with other uses because the quality of the experience is based on the need for isolation and remoteness.

Design Elements

A master plan should be comprised of two parts. The first is the plan itself, which physically maps out areas and prescribes particular uses. Given the magnitude of the project, the plan does not include detailed site proposals or specific design criteria. Although desirable, it would be too difficult to address an entire river valley at that level of detail. The next best alternative is to provide a set of design guidelines. As the second component of the master plan, these



guidelines serve as a method to address design implementation. However, there is a tendency within the landscape architecture profession to treat design guidelines as generic boilerplate material that is not responsive to a particular site or program. It is the intent of this project to avoid such a trap and to explore the use of design guidelines as a logical reflection of the physical and cultural elements of the valley.

The first step was to examine the design requirements of the facilities proposed. The primary purpose of the guidelines is to enhance the quality of the user's experience through proper execution of site details. Signs, as an example, are critical in maintaining or destroying a theme or sense of place. Consistent signs throughout the valley will link the various components of the Uncompahgre plan into a single entity. Signs should suggest the character of the river valley and should be easily recognizable. The use of the Riverway logo as part of the plan's sign design was suggested by students. However, the design of the sign should express each site's individual characteristics. Support facilities, such as rest rooms, parking, visitor center, and picnic

areas, should not degrade the quality of the experience. Design guidelines should explore design options capable of mitigating that which is potentially undesirable but nevertheless necessary in a facility.

Site furniture is another important aspect of design. Again consistency link pieces of the plan together. However, the style of these furnishings should provide continuity without sacrificing diversity, functionality, or the local character. Some elements of the plan will require that structures be built. In these cases, appropriate architectural styles should be used. The character of structures at historical interpretation sites could reflect the theme of the site. Shelters and other buildings not directly related to a historic theme could reflect their location in the corridor. For example, in the lower valley, agricultural architecture would be the model for built structures. Farther south, a style reflecting mining structures or railroad depots would be appropriate. Of primary importance is enhancing the user's experience. A master plan can suggest a location for a roadside overlook, but it is the specific elements with which users come in contact that increases their level of expectation.

SUITABILITY ANALYSIS

This phase is crucial. It is the step where the inventory information is synthesized with the program development information. By rating the valley's suitability for each program element, suitability maps show how

the site can accommodate the program. For this project, three sets of maps that corresponded with the program categories were created. Inventory maps were utilized to locate areas that have a primary or secondary level of suitability.

HISTORIC SITES	EVALUATION CRITERIA														
	Site	Existing Structure	Potential Excavation	Scarcity	Overall Condition	National Importance	State Importance	Local Importance	Historical Significance	Interpretive Potential	Numerical Historic Value	Location on Map	Archaeological Dig	Historical District	
Delta Bank Robbery											5				X
Beet Factory											6			X	
Ft. Uncompahgre											7	A	X		
Ten Mile Stop											5				X
Delta Post Office											7			X	
Delta Federal Building											7			X	
Escalante Expedition											6				X
Olathe Ten Mile Stop											5	B			X
Menoken School											3	C		X	
Montrose RR Depot											7			X	
Lathrop House											5			X	
Montrose City Hall											7			X	
Montrose Post Office											7	D		X	
Thomas Townsend House											6			X	
Old Carriage Shop											5			X	
J.C. Bell Home											5			X	
Small Cabin											5				X
US Reclamation Office											6				X
Ute Memorial Site											12	F	X		
Bosler Ice House											6	D			X
First Airstrip/Golf Course											4	E			X
Vernal Switch											2	H			X
Fort Crawford											10	I	X		
Los Pinos Agency											10	J	X		
First White Grave											5	K			X
Kelly Road											4	L		X	
Ridgway Dam											7	N			X
Chief Shavano's Home											8	M			X
Townsite of Dallas											9	O		X	
Ridgway Roundhouse											6	P		X	
Ridgway 10 Mile Stop											5			X	
Orvis Hot Springs											7	Q			X
Cedar Hills Cemetery											5	R			X
Black Lake											8	S			X
American Lead & Zinc Mill											8	T			X
Silver Shield Mill											8			X	
Radium Hot Springs											9			X	
Ourray's Summer Home											10		X		
Mining in Ouray Area											8	U		X	
Ouray Historic District											11			X	
Trestle Bridges											5	G			X

HISTORIC EVALUATION MATRIX

Explanation of Numerical Historic Value
 0-4 Interpretation of Event/Site can occur elsewhere
 5-7 Significant Historical Site
 8-12 Critical Area, Preserve with specific restrictions

Figure 3. Historic Evaluation Matrix.

By comparing the three categories, historical, managed, and unmanaged recreation, a recreation facility pattern began to emerge. The activity centers could combine historical and managed recreation facilities and be connected by trails of different types and sizes. The region from Delta to Montrose is best suited for historical events that occurred during the “early settlement” period. From Montrose to the reservoir, Indian-related events are more prevalent, and an increase in federal and state-owned land and a greater diversity in landforms increases recreation potential. From the reservoir to Ouray, mining and the railroad become dominant historical events, and wildlife habitats increase.

The suitability analysis is thus and important synthesis step in the master planning process. By looking at the site in terms of each program element, a composite picture emerges that is sensitive to the natural and cultural elements of the site and that responds to a specific program and user needs. Suitability analysis bridges the gap between analysis and design and so leads the way to the final step: development of the master plan itself.

THE MASTER PLAN

The goal of the master plan is to synthesize the information from the previous phases into a design document that can serve as a reference for future planning decisions. This phase involves several steps, starting with concept development. The concept is the underlying premise which governs the physical design. Once a concept is agreed upon, design alternatives are generated and refined until a final plan is created. Working from the original goals of the Uncompahgre Riverway Group and studying inventory and suitability maps, the students developed a concept for the master plan based on the belief that the plan must respond and be sensitive to the natural and cultural conditions of the valley. The concept was to provide a variety of linked recreation activities by creating a hierarchy of trails and a progression of events that would run the length of the river corridor.

Students began the process of locating trail corridors and recreation areas by mapping two alternative schemes. One plan took private versus public land ownership issues into consideration; the other did not.

UNMANAGED RECREATION FACILITIES	DESIGN ELEMENTS										DESIGN DEVELOPMENT MATRIX									
	Paved Surface	Gravel Surface	Restroom	Water Fountains	Lighting	Seating	Trash Containers	Trail Markers	Signs/Information											
Walking Trail	●	●	●	●	●	●	●	●	●											
Jogging Trail	○	○	○	○	○	○	○	○	○											
Hiking Trail	○	○	○	○	○	○	○	○	○											
Day Biking Trail	●	○	○	○	○	○	○	○	○											
Tour Biking Trail	●	○	○	○	○	○	○	○	○											
Mtn. Biking Trail	○	○	○	○	○	○	○	○	○											
X-Country Skiing Trail	○	○	○	○	○	○	○	○	○											
Horseback Riding Trail	○	○	○	○	○	○	○	○	○											
Trailheads	●	●	●	●	●	●	●	●	●											
Hunting Area	○	○	○	○	○	○	○	○	○											
Fishing Area	○	○	○	○	○	○	○	○	○											
Primitive Campsites	○	○	○	○	○	○	○	○	○											

Figure 4. Design Development Matrix.

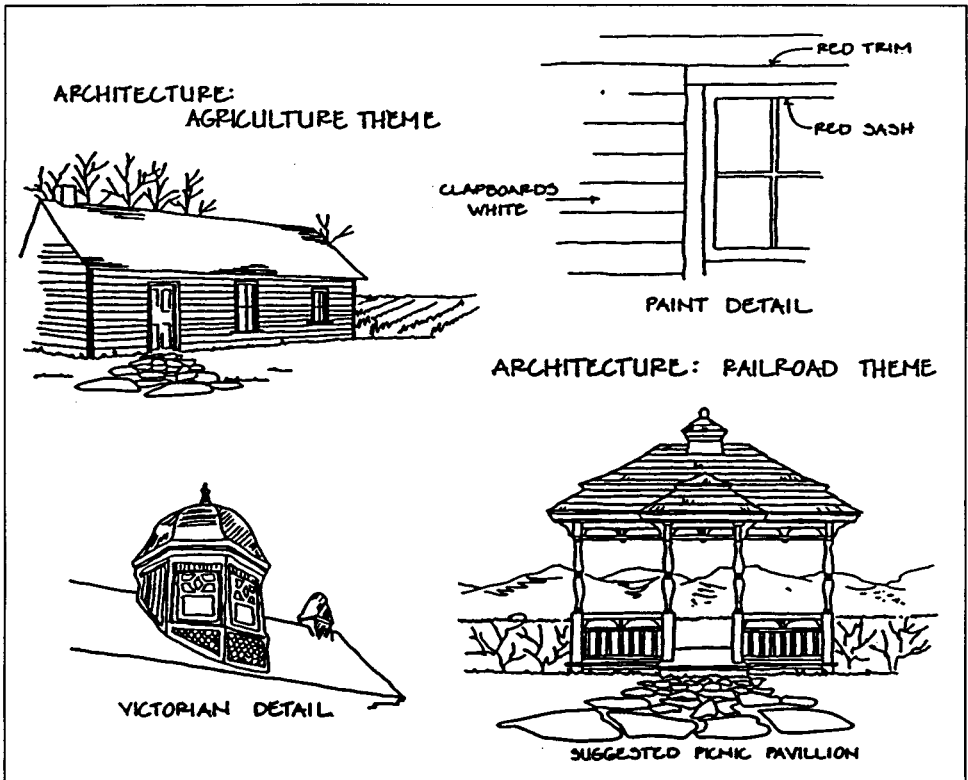


Figure 5. Architectural Themes.

By avoiding privately owned land, less area was available for activity centers and trails in the first plan. Public land was used as much as possible for recreation facilities. Trail corridors were designated alongside existing transportation routes utilizing road and railroad rights-of-way. This plan showed a limited number of trail corridors and activity areas. The second plan was more responsive to the natural conditions of the site. Trail corridors were sited along the river or next to bluffs and vegetated areas. A greater separation of trail types was indicated, and activity areas were larger and more numerous.

These plan alternatives presented an ideal situation where land ownership was not a consideration, and a more realistic plan where ownership was considered.

Lessons could be learned from both plans. A master plan cannot ignore the realities of ownership and development constraints. But a planning effort should not be limited so as to miss potential opportunities. Combining both alternatives resulted in a plan that responded to land ownership and landscape characteristics. The combination plan provided a blueprint of general locations for trails and activity areas. The plan refinement stage involved defining trail and facility needs specifically for the site and establishing a hierarchy of trails. The scale and number of recreation and interpretive events also had to be determined.

Primary trail corridors, designed to accommodate the greatest variety of uses, would require the most improved surface. Secondary trail corridors would accom-

moderate limited activities. A tertiary trail corridor was designated for places where a special loop separate from the main trail corridor might be desirable as part of the overall trail system. Additionally, scenic driving routes were designated as part of the trail system, and a bike lane was recommended along the highway for cross-country biking.

The concept also called for a progression of events. There emerged a need to prioritize and define that progression. The plan included major and minor activity nodes. Multiple use nodes would be located near population centers and provide a variety of facilities. Smaller activity nodes would be located at intervals along roads and trails and would be limited in scope.

The final phase of the design process was the creation of site plan maps showing refined locations for trail and recreational and interpretive facilities and the completion of design guidelines for certain plan elements. It was important during this final phase to look carefully at each program element in relation to the plan as a whole and in relation to the site context in order to best utilize the unique opportunities offered by the study area and to ensure that the plan was not duplicating recreation components. The final plan is comprised of recreational recommendations that take advantage of the physical and cultural resources unique to each segment of the valley.

From Delta to Montrose the plan focuses on the agricultural life-style; farm houses, cultivated fields, and irrigation ditches make up the visual palette. The trail system responds to ownership by locating the primary trail corridor along county and canal roads, with short sections occurring on alluvial terraces and river banks. Secondary trail alignments were designed to encourage local use. They usually occur along county and canal roads and offer an opportunity for a short geological interpretive trail. Where canal roads are utilized, design measures

mitigating conflicts between trail users and land owners have been developed to allow trail access across fence lines without affecting the function of the fence. Signs educating trail users about the functions of the canals will be placed at trail entry points. A scenic driving route has been identified, taking the visitor through agricultural fields and orchards. The touring bike route designated along the shoulders of US Highway 50 has a 150-foot right-of-way. A trail cross section has been designed to allow the cyclist to ride safely and out of the flow of traffic.

Trail nodes occur at five-mile intervals and provide the opportunity for wildlife, historic and geologic signs and unimproved picnic areas. A highway pulloff has been recommended as an appropriate spot for a fruit stand for local orchards during the summer months. South of Olathe, the primary trail passes an abandoned historic one-room schoolhouse planned as a picnic and interpretive site.

The recommended locations for managed recreation areas are at Delta and Olathe, both of which allow residents convenient access. Other historical interpretation opportunities exist that can be linked by the trail telling the story of the valley's history. The story would begin in Delta at Confluence Park at the site of Fort Uncompahgre, the trading post built in the 1830s.

Between Delta and Olathe, an agricultural center is planned to highlight the farming history of the region. This facility would combine several elements, including a reconstructed pioneer farm with exhibits of farming implements and tools. Demonstration canals would show the mechanics of ditches and headgates. The agricultural center would also feature a farmer's market selling fresh produce and local handicrafts with a restaurant serving unusual native western dishes such as buffalo steaks.

Olathe was a ten-mile stop along the railroad between Delta and Montrose. In

this recreation master plan, it will serve as a midpoint activity area between the two larger towns. A walking trail through the town and along the river would serve as a tour and provide access to fishing areas with picnic spots. A wildlife education center in Olathe is recommended as a regional resource for all the schools in the valley, with an exhibit building, outdoor amphitheater/classroom, picnic areas, and interpretive trails.

The Montrose to Ridgway Reservoir section of the plan is a transformation where the character of the valley changes from wide-open farm land to a more enclosed valley with heavier vegetation. Cattle ranching is the prominent agricultural operation. The change in vegetation is evidenced by the abundant wildlife in this section. Since this area was the focus of the conflict between the whites and the Utes, emphasis has been placed on the Ute Indian culture and the events that led to its eventual destruction.

The abandoned railroad bed is recommended as the primary trail corridor, with secondary trail corridors providing loops that connect adjacent facilities and points of interest to the main corridor. The scenic routes are designated along county roads, and the cross-country bike trail remains along the highway on a widened shoulder of US 550. The intersection of trail loops and scenic routes provides small picnic and overlook sites for wildlife, geologic, and historic interpretation. The abundance of federal land in this section requires trailhead locations. Since parking will be necessary, design measures have been developed to mitigate impact between uses.

Montrose has several downtown historic buildings that can be part of a historic walking tour in the city. This trail would also connect to schools and parks, and lead out of town along the Ute Museum trail loop. The great potential for wildlife viewing in this part of the valley would be expanded with the

addition of riparian wetland and pond habitats in Montrose's town park. The Los Pinos Agency and the Fort Crawford sites should be rebuilt as historical structures with exhibits explaining the history and function of the agency and the conflicts with the Ute Indians.

The Ridgway Reservoir is a significant addition to recreation resources in the valley and has already been planned. This plan has been incorporated into the valley's trail system. Trail nodes at points along the river below the dam will require the creation of pools and riffles for improved fish habitat. These fishing and picnic sites will be either simple unimproved areas off the trail or more substantial ones with rest rooms, picnic shelters, and parking areas. Care should be taken to separate activity areas and trails from quiet fishing spots.

The upper end of the Uncompahgre Valley from Ridgway Reservoir to Ouray was considered sacred to the Utes with its dramatic mountain scenery, forest vegetation, hot springs, and abundant wildlife. The master plan focussed on the influences of mining, the Indian way of life before the white man, and the rich ecology. The narrow valley configuration precludes the development of several trail corridors for this section. The primary trail corridor will run along county roads. The bike touring route will continue to follow Highway 550. Both the main highway and the county roads are designated as scenic drives. Some secondary trails are planned up out of the valley as trailhead connections to surrounding national forest and BLM lands. In this upper section, where the elevation exceeds 7,000 feet, ski touring is added to the list of trail uses.

Although limited, ranching operations occur in this narrow valley and require mitigation for cattle crossings and calving areas. Trails can be raised above underpass structures for major crossing areas. Fences and gates can be used in other locations. Calving areas present a special set of issues

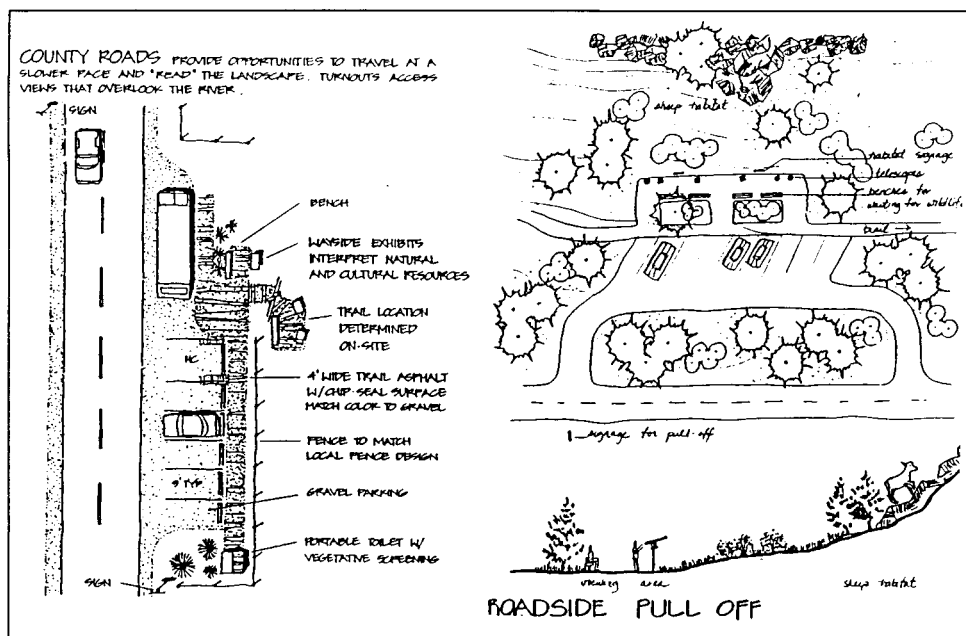


Figure 6. Roadside Pulloff.

for trail design. The first step in design mitigation would be to designate sensitive areas and pull the trail alignment away from those sites. Buffering can be achieved with land form and vegetation as well as fencing. Signs can be erected during calving season to alert trail users to the impacts of disturbance.

Trail nodes, road pulloffs, and interpretive stops will highlight the railroad, ranching, and mining history. Geology and wildlife interpretation will also be featured at the trail nodes. Restored railroad trestle bridges, used as river crossings, will utilize signs to interpret the building of the railroad. At the old town site of Dallas, a frontier saloon town, plans to rebuild some of the town's buildings will provide an area for western history interpretation. Another interpretive area will be located in Ridgway at the site of the original roundhouse and rail yards. When located in wildlife habitat areas, interpretive signs will describe the

eagles, black swifts, deer, elk, and bighorn sheep that inhabit the southern end of the valley. Telescopes will be provided to allow viewing of elusive creatures like the bighorn sheep. Hot springs will be the site of a roadside pull-off with geological and interpretive signs, or a Ute interpretive center could display early archaeological finds from the Uncompahgre Plateau.

CONCLUSION

With the conclusion of the master plan phase, the implementation phase begins. The Uncompahgre Riverway Group has already begun construction on portions of the primary trail outside of Montrose. It is hoped that this document will provide a source of inspiration to carry forward the ideas and visions presented. The results of this project have been compiled in booklet form and will serve as a marketing and promotional tool for the Riverway Group to continue its quest.

Battle Creek's Linear Park

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INTRODUCTION

One of Battle Creek, Michigan's most popular recreation amenities is the linear park that winds along the Kalamazoo and Battle Creek Rivers, linking downtown Battle Creek with various city parks, schools, and neighborhoods. The linear park's 15 miles of paved pathways encircle the city and link up with the state of Michigan's Fort Custer Recreation Area located west of the city.

The linear park provides a wide variety of recreation opportunities for both casual use and programmed events. Walkers, joggers, and bicyclists enjoy the miles of paved pathways, and merchants have learned that the downtown portion of the linear park is an amenity that spurs sales during special events. The City of Battle Creek Parks and Recreation Department and community groups regularly schedule events on the linear park such as walk-a-thons, bike races, running events, and other programs designed to encourage widespread use of the park.

The development of Battle Creek's linear park involved the cooperative effort of many groups and individuals including the Michigan Department of Natural Resources (MDNR), the W. K. Kellogg Foundation, the Battle Creek Area Urban League, and the city of Battle Creek to name a few. The linear park has been well received by the community and has won several state and national awards for its unique design and for the imaginative way in which it was funded and implemented. A complete understanding of the linear park's development and the role that it plays in the community requires a closer look at the city's history, economy, and location in a regional context.

COMMUNITY PROFILE AND HISTORY

Located in the southern Michigan/I-94 corridor midway between Chicago and Detroit, Battle Creek is within easy driving distance of several major metropolitan centers. Sometimes referred to as the "Cereal City," Battle Creek is internationally known as a center for the breakfast food processing industry. The city's major employers include the Kellogg Company, the Post division of General Foods, and the Ralston Purina Company. This collective industry accounts for the largest single work force in the city. Unquestionably, the city's leading corporate citizen is the Kellogg Company which maintains its world headquarters in Battle Creek and is the world's largest producer of ready-to-eat cereals.

As one might imagine, the history of the city of Battle Creek and that of the Kellogg Company are intertwined. The Kellogg family, who moved to the area in the 1860s, were devout Seventh-Day Adventists and followed the faith's health regime of no smoking, drinking alcohol, or eating meat. In 1866 the Adventists set up the Western Health Reform Institute, which later became the Battle Creek Sanitarium, one of the most famous health spas in the world then. While experimenting in the sanitarium's kitchen, W. K. Kellogg discovered a method for flaking wheat, and, in doing so, modern day breakfast cereal was created.

As the Kellogg Company grew and became prosperous, W. K. Kellogg began to look for outlets for his many philanthropic interests. Mr. Kellogg's lifetime interest in nutrition and health concerns led to the

establishment of the W. K. Kellogg Child Welfare Foundation in 1930. The Foundation was later reorganized as the W. K. Kellogg Foundation which has become one of the country's largest foundations. Over the years the W. K. Kellogg Foundation has been a benefactor of many community projects including, as we will see later, Battle Creek's linear park.

As the Kellogg Company and the cereal industry grew in the first half of the twentieth century, Battle Creek provided a stable employment base that allowed it to ride out economic downturns better than most mid-western communities. A combination of factors led to an unraveling of the city's economy in the 1960s, however.¹

Battle Creek's fortunes began to change for the better in the late 1970s and early 1980s. The city's Fort Custer Industrial Park began to grow into a regional success story, attracting large foreign investments mainly from Japan and Germany. During the same period, a new regional shopping center was built on the outskirts of Battle Creek and a first-class hotel and convention center was constructed in downtown Battle Creek. These latter two events signaled the end of the downtown's traditional role as the main retail district and ushered in its new beginning as an office and service economy.

Just as the central business district appeared to be entering a difficult period of transition, it received a major boost from the Kellogg Company when the company announced plans to construct a new \$75 million corporate headquarters downtown on the Battle Creek River. The proposal signaled a new era of expanded riverfront use as a downtown amenity. The Kellogg Company's announcement was significant for a number of reasons, including:

The headquarters would bring a large white collar work force downtown, lending support to the growing office and service economy.

- The development included the construction of an eight-acre riverfront park dedicated for public use.
- The development allowed the city to leverage a \$12 million UDAG Grant to construct streets, parking lots, mini parks, and other downtown amenities.
- The development spurred new private investment downtown, including a new festival marketplace adjacent to the city's downtown hotel / convention center.

These events contributed to the positive momentum which allowed Battle Creek to undertake the next step in its revitalization: the development of the linear park.

THE LINEAR PARK DEVELOPS

The seeds for Battle Creek's linear park were planted in 1980 when the city completed a railroad consolidation project that left approximately 2.5 miles of abandoned railroad running through the heart of downtown at its disposal. Then City Engineer, Tim Hatfield, and City Landscape Architect, Al Wilcott, originated the linear park concept by proposing a modest system of paths and park amenities for this stretch of railroad right-of-way. The linear park received widespread public support and quickly grew into a metropolitan linear park proposal that would include over 28 miles of pathways for non-motorized recreation.

After a thorough review of various funding methods, the city sought a 50/50 matching grant from Michigan's Land Trust Fund administered by the Michigan Department of Natural Resources (DNR). The \$995,000 application was matched by the estimated value of park land to be contributed by the city. The Michigan DNR was enthusiastic about the project during the grant review process, but expressed concern about Battle Creek's ability to construct and maintain

the park. The city made a commitment to the DNR to allocate approximately \$112,000 annually from the General Fund to the maintenance and security of the park.² Construction funds came from two basic sources: approximately \$1.2 million from a \$12-million Urban Development Action Grant (UDAG) awarded to the city in 1982 to complete various downtown improvement projects, and a \$3.5-million grant from the W. K. Kellogg Foundation to construct other portions of the park. With these commitments made by the city and the Kellogg Foundation, the Michigan DNR awarded Battle Creek its grant in January 1984.

The W. K. Kellogg Foundation's grant to the city was a continuation of its historical support to local projects. The grant stipulated that funds were to be used in such a way as to provide job training and skill development opportunities to local youth. In order to meet this goal, the City of Battle Creek entered into a contract with the Battle Creek Area Urban League (BCAUL) to manage the recruitment and training of area young people. BCAUL worked with local youth agencies, schools, and neighborhood organizations to select workers. Up to 135 youths were hired each summer between 1985 and 1987 for periods of 10 to 16 weeks.

Youth were taught basic construction skills and rules and regulations of their employment during intensive orientation programs. They worked in groups of eight to ten under the direction of a skilled supervisor. In addition, three lead supervisors were hired for their specific skills in the areas of personnel, construction, and administration.³ Work crews were employed in preparing paths, trimming trees, clearing brush, landscaping grounds, building decks and boardwalks, erecting gazebos, and pouring concrete. For many of these young people, it was their first structured work experience; as a result, they were taught valuable lessons about teamwork, punctu-

ality, and attendance in addition to learning marketable job skills.

THE DESIGN OF THE LINEAR PARK

The basic route of the linear park was selected by the city's Engineering Department based on a common-sense evaluation of lands owned by the city of Battle Creek or the Battle Creek School System along the desired route. As one can see in Figure 1, a large portion of the linear park follows Battle Creek and Kalamazoo River which provided pleasant, easily accessible areas for the park development. The majority of the remaining park passes through existing city parks, an arboretum, schools, and a community college campus. This design has resulted in a park-like atmosphere along virtually the entire length of the linear park.

Several areas of the linear park initially appeared to present obstacles which were creatively turned into assets. For instance, an area along Wagner Drive with a steep bank required the construction of a 1200-foot-long boardwalk to complete the path connection. Another area, east of Kellogg Community College (*Figure 1, Points of Interest E and I*), at first glance presented poor siting options until an agreement was reached with Consumers Power Company to purchase a utility right-of-way for the path. With these problem areas solved, the path easily winds its way. In 1988, a western spur approximately 3.6 miles long was linked to the main loop system to connect with the city's Fort Custer Industrial Park.

As the city began to develop the route for the linear park, it hired the landscape architectural firm of O'Boyle, Cowell, Blalock & Associates, Inc. (OCBA) to prepare a detailed master plan for park amenities. This planning effort came as a natural extension of the firm's previous work in designing downtown improvements

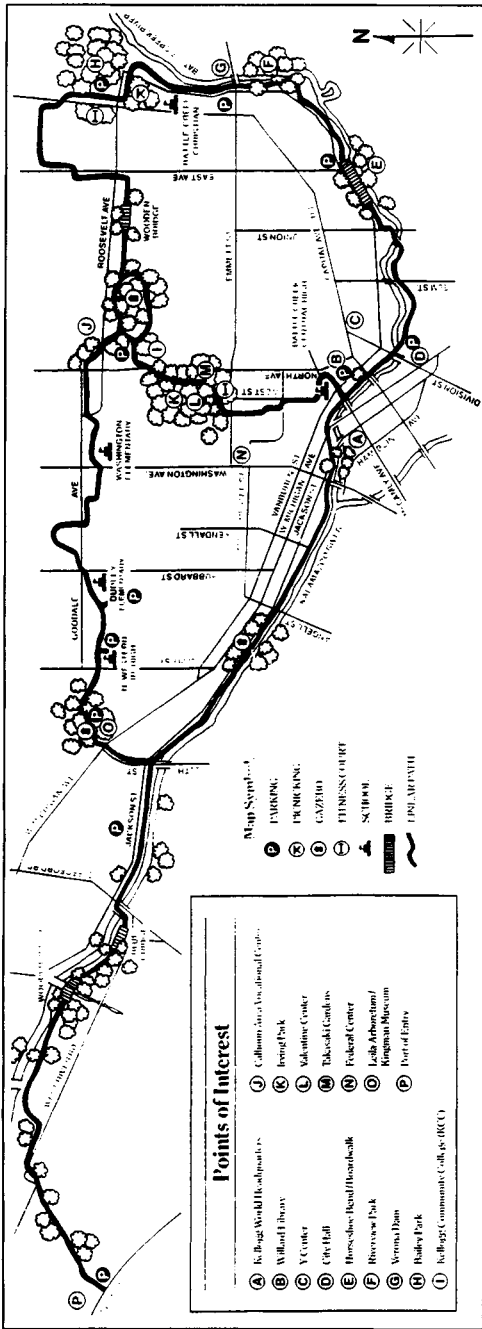


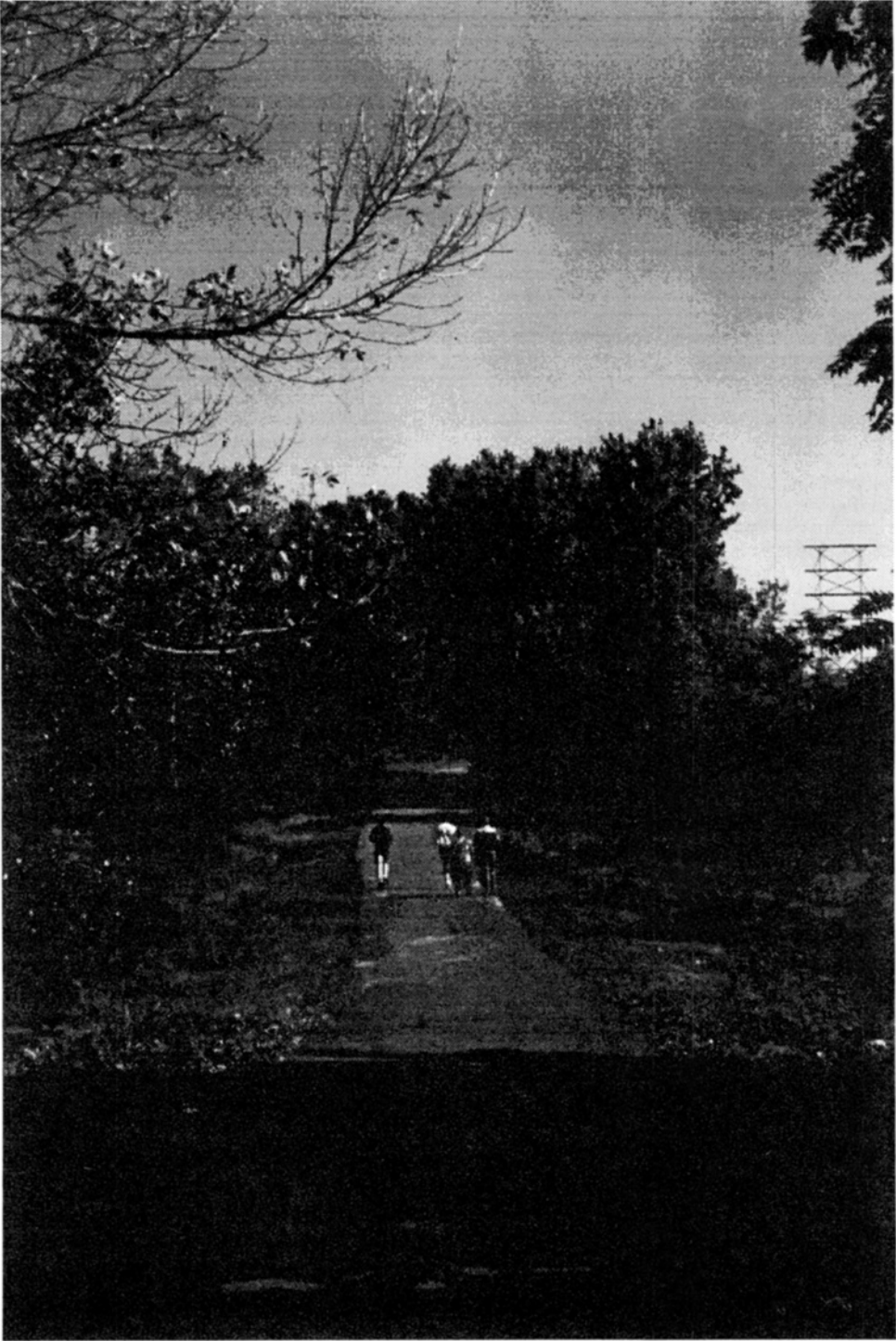
Figure 1. Battle Creek's Linear Park.

financed by the city's UDAG Grant. OCBA's basic task was to propose a package of amenities for the linear park that would begin to develop a quality character and image for the park.

New park areas, located at points between the major nodes (existing parks, schools, etc.) identified by the city, were recommended. The landscape architects felt that these park areas were important to the success of the park since the major nodes were sometimes several miles apart. These new parks were concentrated along the rivers partly due to expediency (these areas were already under city control), but mainly because it was felt that these areas would have the most widespread appeal due to their proximity to the water.

The downtown portion of the linear park stretches over a five-block area. The downtown linear park segment was seen as the "jewel" that could act as a stimulant to bring people back to the town center. On the west end of this section stands the recently completed Kellogg Company World Headquarters complex. As mentioned earlier, the Kellogg development included the construction of an eight-acre quasi-public park on the Battle Creek River. This passive-recreation park features paved paths, benches, two pedestrian bridges, and extensive landscaping and serves as a prominent anchor to the west end of the downtown linear park.

The linear park follows an abandoned railroad right-of-way along the north bank of the Battle Creek River throughout this stretch of downtown. In the 1950s, one block of the river was channelized and covered with a parking lot to service the adjoining retail district to the south. The removal of the parking lot, suggested by previous planning studies, was carried out as part of the linear park's construction. This left the landscape architects with the challenge of beautifying the channelized river. The solution featured repetitively spaced sitting



areas cantilevered over the existing concrete seawalls to provide overlooks and a sense of drama to the park. A formal brick promenade links the overlook areas along a 500-foot-long stretch of the river. Other amenities in this section of the riverfront include several small gardens to provide pleasant sitting spaces and give relief to the hard-surfaced promenade. A pedestrian bridge was also constructed here to link nearby features.

Site amenities were designed to withstand hard use and to provide allusions to the area's railroad and cereal industries. The riverfront was also designed to accommodate annual festivals such as The World's Longest Breakfast Table. This and other festivals were seen as important components in changing the image of the downtown riverfront from an industrial back door to a lively, vital urban park. East of the riverfront promenade the linear park continues along the former railroad right-of-way passing by several churches, the District Court, the Police Station, and the City Hall.

CONCLUSION

As mentioned earlier, Battle Creek's linear park has been well received by the community. Despite its youth (the main loop of the linear park has only been open since 1986), the park is used by over a dozen community groups for annual events, and an equal number of special events are programmed by the city's Recreation Department. Mr. Linn Kracht, former linear park director, and now Superintendent of Recreation for the City of Battle Creek, reports that casual use of the

park by individuals has also been high with peak usage occurring in the early morning and late afternoon-early evening periods. Thanks to the city's foresight in allocating funds for the maintenance and park security, citizens' concerns about the safety and upkeep of the park have not materialized. Police presence has reduced incidents of vandalism and crime to a minimum, further encouraging family use of the park. Maintenance is handled through the city's Department of Public Services, with a separate crew assigned exclusively to the linear park.

The linear park has been the recipient of several state and national awards, including honors from the Michigan Chapter of the American Society of Landscape Architects, the Michigan Municipal League, the Waterfront Center of Washington, D.C., and the United States Department of Housing and Urban Development.

The future of the linear park also looks bright. Recent developments such as the relocation of industries from riverfront sites to the Fort Custer Industrial Park, and the W. K. Kellogg Foundation's announcement that it will construct a new headquarters building on a downtown riverfront site seem to point to a continuation of riverfront revitalization and the success of the linear park. Future plans call for the linear park to be extended south to link the park's main loop with the popular Binder Park Zoo. If the past is any indication, this connection will be made without a hitch and Battle Creek can boast of a linear park system unparalleled for a city of its size anywhere in the country.

Figure 2. (opposite) Typical Section of the Park Path.

NOTES

1. Tom Brauer, "Overall Scene, What Makes Battle Creek Tick," *Scene Magazine*, July 1989 (Volume 14, Number 7), pp. 8-9.
2. Annual Report—The Battle Creek Linear Park, 1984.
3. Annual Report—The Battle Creek Linear Park, 1984.

The Davis Greenway: A Case Study of a Diversified System of Open Space, Trails, and Wildlife Habitat for the City of Davis, California

Stanton Jones, Associate, Davis Rural Land Trust, Davis California; and Mark Francis, Center for Design Research, University of California, Davis

INTRODUCTION

We recommend [that] communities establish Greenways, corridors of private and public recreation lands and waters, to provide people with access to open spaces close to where they live, and to link together the rural and urban spaces in the American landscape.

Americans Outdoors: The Report of the President's Commission, p. 142

By the year 2000, approximately 80 percent of the 280 million people living in the United States will be living in cities. This rapid influx of inhabitants will stretch the ability of a city's resources to provide for the population's needs in many areas. One resource that is already under intense stress is the open space and recreational areas available to the public, both areas within cities as well as outside existing city limits. Most of our current open spaces were created long ago. Hence, most of today's parks and open spaces are old and outdated (and given the current state of public budgets, probably showing their age), not equipped as well as they should be (again, due to public finances), or threatened with loss through development (especially areas that are sensitive and important habitats and ecosystems, such as wetlands and riparian habitats). In addition, many of the parks in existence today are largely under-utilized, due in large part to the inaccessibility of the park (distance, perceived level of safety) to

the very people it was created to serve. The result of this situation is easy to deduce: in the future, more people will be attempting to use a resource that has one or more of four characteristics: 1) outdated, 2) poorly maintained, 3) threatened by development, or 4) inaccessible.

But how does this analysis apply to the city of Davis, California, and to other semi-rural cities and towns across the United States? Currently, Davis is a city of 48,000 people with a fair amount of open space and recreational opportunities available to its inhabitants. But with Davis's current growth rate of 2.2 percent, the population of Davis will reach 80,000 shortly after the year 2000. Compounding this problem is the growth that the San Francisco Bay and the Sacramento metropolitan areas are experiencing. This growth is putting significant pressure on the city of Davis to expand at a more rapid rate. Real estate prices, a sure indicator of growth pressure, have spiraled upward in recent years at an alarming rate. (Bay area home prices have appreciated 35% in the past year alone.) In a 1989 report by the People For Open Space (a Bay area open space advocacy group), the group stated that decisions made within the next three to seven years will determine the status of open space well into the twenty-first century, and that failure to act in the immediate future will result in lost opportunities for preservation that will probably never come again.

What seems necessary is an immediate increase in the amount of preserved open

space available to the public for use now and in the future. But is it enough to consider only increasing the *amount* of preserved open space, or should we consider the *quality* as well? If a large number of parks are unused, why bother to create more parks?

The answer lies in the fact that increasingly more people are recreating closer to home, because of economic-related causes, the amount of available leisure time, or the problems of traveling can present, especially with the increased pressure on highways near urban areas. This trend of staying closer to home has, in turn, led to the discovery of local resources that residents may not have known about before. As a result, parks and open spaces will have to be more than just playing fields and hard courts. They will need to be creative, adaptable, and accessible to more than just the people within a two-minute walk of the park. They will also need, in many cases, to consider issues relating to wildlife and habitat preservation. People are not the sole users of park and open space systems, and with habitat disappearing at an ever-increasing rate, these issues will become only more important in the future.

Can a creative, exciting alternative to the traditional park be created that can expand to meet future need, change with changing recreational demands, and solve the accessibility dilemma? Can wildlife and its habitat be protected and maintained in the face of increasing growth and use pressures? Can all this be done, considering the difficulty municipalities have had in financing open space projects in the past? The answer to all of these questions is *yes*, and the solution can be found in the idea of the urban greenway.

GREENWAY HISTORY

To waste, to destroy, our natural resources, to skin and exhaust the

land instead of using it so as to increase its usefulness, will result in undermining in the days of our children the very prosperity which we ought by right to hand down to them amplified and developed.

Theodore Roosevelt, Message to Congress, December 3, 1907

The current concept of the greenway is the result of, and a reaction to, the development and subsequent redevelopment of a once abundant supply of open space in a growing America. This reaction is by no means a new method of dealing with the problems of overcrowding and overdevelopment. One can trace the idea back to the linear parks popularized early in the development of the United States, during the first stage of urban development in the nineteenth century. Examples of early linear park systems include the Bronx River Parkway in New York City, the Rock Creek Park in Washington, DC, and the Emerald Necklace in Boston. The goal of these types of parks, as Olmsted and Vaux stated in their Greensward Plan, was to provide city-dwellers "a specimen of God's handiwork that shall be to them, inexpensively, what a month or two in the White Mountains or the Adirondacks is, at great cost, to those in easier circumstances." This idea was readily accepted by citizens and politicians, and the concept was soon adapted to many purposes, such as the creation of large, interstate, linear open space systems like the Appalachian Trail in the East, which stretches from Maine to Georgia; and the John Muir Trail in the West, which runs the length of the Sierra Nevada Mountains. However, this idea of providing large tracts of open space that were easily accessible to many people seemed to give way during the housing boom that followed the Second World War. Large subdivisions were being haphazardly planned, with little regard for the farm lands and natural habitats

they were destroying, and little concern for the coordination of open space planning between neighborhoods. Development has continued to sprawl even to this day, aided by the development by making it easier and quicker to travel farther.

However, our extensive highway system is quickly becoming more congested, possibly making it more attractive to live and recreate closer to home; currently, 90 percent of the public spends 90 percent of its leisure time in cities (*National Urban Recreation Study*, 1978). As a result of all this development, "the quality of the outdoor estate [has become, and] remains precarious. . . . We're losing available open space on the fringe of fast-growing urban areas and near water. Wetlands and wildlife are disappearing" (*Americans Outdoors*, p. 162).

To help reestablish some of the lost habitat and open space, and to preserve and protect what little of the original habitat is left, the concept of the modern greenway has been developed. This highly effective and adaptable idea is beginning to gain wide acceptance throughout the country as a method of establishing large, innovative, accessible, and popular parks that serve the public's needs while enhancing the city's image as a community that values open space and recreation. The fact that the United States is urbanizing over 3,000 acres of land per day and over one million acres per year (Gold, p. 111), seems to mandate that action be taken now to preserve open space and habitat in the future. In California alone, the population has grown from one million in 1900 to a projected 30 million in 1990, and will increase possibly to 50 million by the year 2020 (*Ibid.*).

What this concern means, for Davis and for communities throughout the country, is that now is the time to begin planning for the future, regardless of how safe or adequate the current situation may appear. In Davis, for example, open space seems plentiful

now. However, if the population doubles by the year 2000, the current plan for future open space may not be enough to accommodate the growing population, nor will it be accessible to the majority of the public, due to the predicted increase in traffic. In addition, significant preservation opportunities for endangered habitats like riparian and wetlands tracts could be missed if care is not taken in planning for the long-range protection and preservation of these of open space habitat. A greenway can provide the framework for a successful open space element in the future for Davis. Such an effort would place Davis at the forefront of recreational planning, as it was when it created the bike lane system throughout the city, the most ambitious system of alternate transportation at that time. This is the type of forward thinking that is required to assure Davis a future of accessible and successful open space and wildlife habitat.

DAVIS—A BRIEF HISTORY OF OPEN SPACE PRESERVATION

Throughout its history, Davis, California, has been a leader in innovation and community support in the areas of open space, recreation, and environmental concerns. During the 1960s, Davis implemented the most ambitious bicycle-lane project to that date, providing an alternative to auto traffic that has taken hold to the point that Davis is known as the "bicycle capital of North America." Other innovative ideas include the creation of Village Homes, a residential development planned around open space, while providing solar access for all the residents. This environmental approach to development, spurred by the environmental movements of the '60s and '70s, has shaped Davis into the community that exists today. The majority of the citizens of Davis still support these beliefs, as evidenced by the proportion of Sierra Club members

residing in Davis (the highest per capita in the nation).

Another indicator of public involvement and concern in the continuing development of Davis has been in the political arena, with legislation centered on the issues of open space preservation (Measure S, June 1986), and slow growth (Measure L, June 1986) enacted recently. Both measures have had and will continue to have significant consequences for the future of Davis. Measure L called for Davis to grow "as slow as legally possible." This measure, approved by 58% of the voters, will continue to affect Davis as it moves toward the year 2000 by helping to limit the type of growth that has destroyed the character of many communities throughout California and the United States. However, growth pressures from San Francisco and Sacramento, as well as rising housing costs and the lack of affordable housing in Davis, are putting this measure to the test.

Measure S, proposed by a citizen action group called Save Open Space (S.O.S.), sought to preserve an abandoned parking lot in downtown Davis that was slated to be developed as a mall / shopping center. A compelling grassroots effort succeeded in stopping the scheduled development, by a vote of 58% to 42%, and preserved the space for the creation of an enlarged Central Park. This mandate, although it applied only the Central Park issue, shows how far the people of Davis are willing to go to preserve and enhance the character of their city through the preservation of open space. While S.O.S. was formed solely for the purpose of preserving the Central Park space its leaders indicated that the group, or another similar organization, could and should be utilized in the future to maintain a level of public awareness concerning similar issues of open space preservation (such as a greenway system). This suggestion was taken to heart in December of 1988, when Friends of the

Greenway was established to help educate the public and act as an advocacy group in support of the greenway concept.

In December of 1987, the latest General Plan for the City of Davis was approved by the city council after a ten-month preparatory period. This General Plan, a replacement for the General Plan of 1973, has been the subject of some controversy, due mainly to the rapid development of the plan and the limited amount of public input. The 1973 Plan had evolved over a two-and-one-half-year period and was the work of 11 citizen's committees composed of 120 Davis residents assisted by City staff. The 1987 Plan was prepared, as stated in its opening section, "by consultants and staff in accord with tentative decisions made by the city council following consideration of Alternative Sketch Plans." However, the resultant document is a comprehensive plan that has some real visionary possibilities, and the interest concerning the current Greenway Plan has spurred the city into updating the Open Space Element (O.S.E.) of the 1987 General Plan to include the greenway. Many sections within the current General Plan mandate the preservation of open space and wildlife habitat in the Davis planning area, but the addition of the greenway idea has given a coherent framework to the O.S.E. and to the General Plan as a whole.

In addition to the Davis General Plan, the University of California, Davis has just approved its Long Range Development Plan (L.R.D.P.). The Davis General Plan takes into account, as it must, the effect the university has on the city. It is substantial. The university's L.R.D.P. sets the course that U.C. Davis will take during the next 20 years, and the changes that will be occurring, including campus growth, open space preservation, and issues of agricultural and research land use, will certainly affect the General Plan, as well as the community itself. One positive element in the L.R.D.P.

is the idea of "campus as arboretum," which fits well into the concept of the greenway. As the university proceeds with its plan for growth and expansion, it will need to work with the city increasingly in the future, helping to maintain the strong connections that have contributed so positively and economically to both institutions. This relation, too, is covered in the Davis General Plan, Section 2-7B, which outlines the need to "express the interdependence of Davis and U.C.D. in the design of the city and of the campus."

The next few years will be critical in the development of Davis. Decisions made now will either help or hinder the ultimate outcome of the growth and development that the city of Davis is currently undergoing. The opportunity for innovation and creativity in urban design that currently exists, however, may disappear within the next several years. Development can proceed very rapidly. Without a strong commitment to community image and character, it could serve to transform Davis into another sprawling bedroom community. However, the opportunity does exist now to plan the future development of the city of Davis in a manner that is innovative and exciting. Creative planning will add to Davis's image, enhancing it, providing citizens with both a city and a way of life. The idea of a greenway system for Davis is one way this goal could be accomplished.

Negative constraints . . . inhibit creative solutions that come from a fully integrated marriage of ecology and design. Design must go further and ask: "How can human development processes contribute to the environments they change?"

Michael Hough, *City Form and Natural Process*, 1984, p. 23

THE DAVIS GREENWAY: What It Is and What It Has to Offer

A greenway, in the case of Davis, California, is a coordinated system of open space that links existing natural and cultural facilities using city streets, railroad rights-of-way, utility easements, and natural features such as stream corridors and drainage channels. Greenways can also provide corridors of wildlife habitat, act as a buffer zone between developments, and offer many other valuable benefits, such as:

1. Providing citizens with recreational opportunities ranging from quiet enjoyment of natural areas to hiking and bicycling
2. Making available areas where local flora, fauna, and their ecological relationships can be studied
3. Conserving open spaces in and around the expanding urban area in the face of explosive development
4. Increasing the value of nearby property
5. Preserving a means for the city dweller to have a closer relationship with nature
6. Complementing and connecting Davis's existing and future parks, improving the accessibility to these parks, and helping to increase the use of some of the lesser-utilized parks
7. Providing a safe alternative to the streets for pedestrians and bicyclists commuting between homes, schools, parks, offices, and commercial areas
8. Increasing the economic base of Davis by helping to revitalize the downtown area and attracting more tourists interests in experiencing the city, its culture, and its open space
9. Helping to integrate the Davis open space system with the university's open spaces, creating a much larger network than either could create on its own,

providing citizens and students with a myriad of choices for recreation

These are only a sample of the many benefits a greenway could achieve, given the opportunity. Add to these results a sense of civic pride stemming from the support and help of many citizens, serving to foster a sense of public ownership and achievement. The Davis Greenway will also help strike a balance between open space and development, providing a coherent framework for the future while preserving some of the past. Implementing an open space preservation plan like the greenway will also significantly improve the outward image of the city, preventing it from becoming a city of tract homes next to tract homes, development next to development, while attracting more tourists and supplementing the local economy.

The main role of the Davis Greenway will be to provide linkages among many of the city's resources, both human-made and natural. Instead of seeing Central Park separate from the Davis Art Center, or seeing Oak Grove Park separate from the University Arboretum, or from Putah Creek, they could all be seen as a part of the whole system, integral in the fabric which makes up Davis. This role will be discussed at length in subsequent sections of this paper.

THE DAVIS GREENWAY PLAN

The city that has places for foxes and owls, natural woodlands, trout lilies, marshes and fields, cultivated landscape and formal gardens, old as well as new buildings, busy and quiet urban spaces, is a more pleasant and interesting place to live in (Hough, p. 21).

This proposal for the Davis Greenway is unlike most greenway projects across the country, not in its purpose, but in its overall design. The purpose of greenways, as stated

earlier, is to preserve open space and wildlife habitat in urban settings, while also providing linkages between both cultural and natural areas. While most or all greenways achieve this goal, the Davis Greenway offers an opportunity to create a *multi-layered system* of open space and habitat, in and around the community, that will meet the needs of a growing population and that is economically beneficial to the community's public and private sectors. With the downtown areas serving as the "hub," this ring of open space would serve to link the downtown area to the university, the university to West Davis, West Davis to the Davis Art Center, the Art Center to South Davis, and all of the aforementioned to the existing parks and wildlife habitat areas in and around Davis. This design will enable residents to travel, on bike, on foot, or in some areas, on horseback, experiencing a wide variety of recreational opportunities that are not currently available.

The city of Davis has within it a well developed park and recreational system that provides open space for its citizens. However, many of Davis's parks are unused or underused, due in large part to problems with accessibility and programming. In a 1977 study entitled *Neighborhood Parks: The Nonuse Phenomenon*, Dr. Seymour Gold found that one of the most significant environmental factors contributing to nonuse in parks was poor accessibility. This concern was also expressed in a survey done recently on recreational habits in Davis (Jones, 1988). This survey also indicated that the main reason people did not use the parks was that there was nothing to do. Both of these problems could be overcome in the implementation of a greenway system. In a community as environmentally aware as Davis, an idea such as the greenway could take hold quickly and become a major asset to the community—socially, economically, and environmentally.

RATIONALE FOR A GREENWAY SYSTEM

The case for the implementation of a greenway system in Davis is strong, given the current development and growth. From an environmental standpoint, the rapid growth of Davis and surrounding areas could severely impact many aspects of environmental quality, especially in promoting the conversion of agricultural lands to urban uses. The current General Plan will cause the conversion of 1900 acres of prime agricultural land to urban uses, according to the Davis Environmental Impact Report. While development of these lands may seem economically attractive, the image and character of Davis will be severely altered if this conversion takes place without some thought as to how to replace or preserve the feeling of openness or spaciousness that Davis currently has. A greenway design could help mitigate the negative impacts of lost open space along corridors that ring and run into the city. These corridors might range anywhere from 50' to 1500' in width, providing a diversity of experiences while also preserving the open feeling Davis needs to maintain its character. (For a more detailed description of the greenway corridors, see the following section.)

Looking at the issue from a recreation standpoint, there is a tremendous desire for innovative and exciting types of recreational opportunities in the city of Davis. While Davis has many parks, as stated before, most of them are sorely underutilized. Still, as the Recreation in Davis Survey revealed, most people who live in Davis recreate in Davis. While between 80 to 87 percent of those surveyed said they used the parks and campus spaces for recreation, only 21 to 29 percent said they used them more than once a week. The most popular place for people to recreate is at home, yet the most popular form of recreation in Davis, according to

those surveyed, is walking for pleasure. This discrepancy in the survey results could indicate several things, one being that accessibility is a key factor (possibly greater than indicated in the survey), or two, that there is a need for more areas to participate in passive recreation. This idea seems to be reinforced by the fact that, of those surveyed, 100 percent indicated that they would use the greenway for at least one of a variety of purposes: walking (74%), biking (72%), picnicking (54%), or any number of other activities appropriate to the greenway. The respondents also indicated a strong (90%) willingness to help support the greenway through taxation, bond issues, or donations, or by helping to maintain or construct it. These results indicate a strong desire for the implementation of a greenway system.

Open space preservation may at first seem costly. However, the opposite is true. While it is difficult to quantify the benefits of open space in a dollar amount, it is possible to do so, and the results are striking. Several empirical studies reviewed by the junior author have been done concerning "the economic impacts and benefits of urban open space (Schroeder, 1982). Empirical work by Correll, Lillydahl, and Singell (1978) found that proximity to greenbelts in Boulder, Colorado directly increases property values. In a study of urban parks, Hammer, Coughlin, and Horn (1974) determined that homes closer to a city park sold for higher prices than similar ones located further from the park" (Francis, *Urban Open Spaces*, 1974, p. 94). Many developers have argued against open space because it does not generate profit. However, this research serves to disprove that claim, and in Raleigh, North Carolina, home of the Capital Area Greenway, developers who once argued strongly against the creation of the greenway are now completely in favor of it. Many have realized larger profits, and all are providing a much-improved environment that can serve

Figure 1. Economic Benefits of a Greenway System

Economic Development (market values)	\$660,000
• 50,000 population × 33% users × 20 visits/year = 330,000 visits	
• 330,000 visits × \$2.00/visit = \$660,000 spent in Davis on food, supplies, or equipment used in the greenway	
Increase in Property Values (property tax revenue)	\$17,050
• 17,051 single family units in Davis (ultimate number as per 1987 General Plan)	
• 17,051 × 2% (homes affected by greenway system) = 3410 units	
• 3410 units × \$200,000 assessed value = \$682 million; assuming a 10 percent increase in assessed values projects an additional \$68.2 million tax base. The City of Davis receives \$2.50 in property taxes per \$1000 of assessed value. A \$68.2 million increase in assessed values will yield \$17,500 in additional property tax revenue.	
Tourism (nonresidents)	\$60,000
• 10,00 visits/year × \$3.00/visit = \$30,000; assuming a multiplier effect of \$2.00 generated for every dollar spent projects a market value of \$60,000/year	
Energy Conservation (residents)	\$330,000
• 330,000 visits × \$.50/visit = \$165,000 energy savings in transportation cost by using the greenway instead of regional park for day use	
• 330,000 visits × \$.50/visit = \$165,000 energy savings in space heating and cooling while using the greenway instead of staying at home	
• The combined total of \$330,000 energy savings becomes disposable income, adding to the Davis economy	
Total Estimated Annual Economic Benefits	\$ 1,220,500
Total Estimated Economic Benefits × 25 years	\$26,676,250

Format adapted from the S.O.S. proposal for the Arden-Mayfair project; analysis similar to one utilized for the American River Parkway in Sacramento, California.

as a showcase development for their firm. In fact, the development community in Raleigh, together with the city, have co-written a new facility fee program that establishes fees and sets guidelines for subdivision and site plan applicants. Davis has several developers who already support the greenway idea, and some have begun to realize that by increasing the amount of

open space, and by providing contiguous access to other open areas (like along routes of the proposed greenway), their profits will increase, even though the number of lots will actually decrease.

The actual benefits of open space preservation are many, and they should be addressed in conjunction with the capital costs of implementing this type of project.

Benefits can be either quantifiable, such as user satisfaction, energy conservation due to use of local parks, tourism, and increased land values, or they can be non-quantifiable, such as improvement of mental and physical health, reduction in levels of air and noise pollution, increased opportunities for the disadvantaged, and increased community identity and imageability. Utilizing the most conservative quantifiable benefit estimates for a system of open space like the Davis Greenway yields a significantly favorable benefit/cost ratio for this investment in the future (see Figure 1). The estimated economic benefit of a greenway in Davis is approximately \$1,220,500 per year, or \$26,676,250 over a 25-year span. The costs associated with the implementation of such a system could vary a great deal, due in part to the method utilized to acquire the necessary land. Supposing a \$500,000 per year capital investment (for land acquisition, construction of trails, etc.), and maintenance costs of \$100,000 per year (trail maintenance, cleanup, etc.), the total expenditures total \$600,000 per year, leaving a \$620,500 economic benefit from which the city stands to benefit in many ways. The projection of expenditures is probably high (given that the City of Raleigh, North Carolina spends approximately \$100,000 per year on its Capital Area Greenway), but it does serve to make a point—that an open space system like a greenway could contribute a significant amount to the economy of Davis.

ELEMENTS OF THE DAVIS GREENWAY

The Davis Greenway can best be understood by examining the different elements it contains. The greenway includes four main categories of elements: Greenstreets, Ring Greenway, Connector Greenways, and Natural Habitat. While they all contain many of the same features, they also differ in

many areas as well, such as use, function, or size. However, it is important to remember that together they constitute a formidable open space system, which could work towards assuring the future residents of Davis the same opportunities for open space, recreation, and habitat preservation that many of today's residents enjoy or possibly take for granted.

Greenstreets

Streets provide us with the essential freedom of movement on which city life depends. They make and reveal the city. But in the rush to connect, we have ignored their other functions. Should we not reinvent the street to reflect the reality of mixed uses?

Stephen Carr and Kevin Lynch, *Open Space Freedom and Control*, 1979, p. 9

The concept of Greenstreets fits well into the fabric of Davis, given that a part of its image is that of a green, tree-filled community. The Greenstreet portion of the greenway utilizes the existing bike lane system, and, over a period of time, will add signs that direct people to other potential linkages in the overall greenway system. These signs might include directions and distances to nearby parks or points of interest; information on historical sites, community gardens, or interesting wildlife and habitats; or simply a logo identifying the street or trail as a portion of the greenway.

In examining Greenstreets, a hierarchy of usage is clear. The main Greenstreets are the most heavily utilized for bicycle automobile traffic. While this pattern of use is sure to continue, it is important to develop alternative routes to be used in the future, due to the expected increases in traffic flow on some of these streets. Alternatives could include the development of greenway bike lanes on less-traveled streets, or the creation of trails along side streets.

An important element in the design of a Greenstreet is the use of vegetation to create canopied thoroughfares, which are more aesthetically pleasing as well as more energy efficient. Aesthetically, a well-canopied street is much more enjoyable to ride on during the hot summer months, when temperatures in the 100s are not uncommon. Environmentally, a street with adequate vegetation will not only inhibit the creation of “the urban heat island” as Michael Housh (1984, p. 32) describes, but it will also support a diverse population of wildlife absent in so many cities.

Unfortunately, many of Davis’s streets are currently far from canopied, and unless some design changes are implemented, more of these wide-open asphalt swaths will appear. One remedy for this problem would be to set the sidewalk and the street about four feet apart and create a “treelawn,” or planting strip, closer to the street. Bringing vegetation closer to the street will not only help canopy the street faster, it will also serve to slow down traffic. A recommendation to design streets in this manner in future subdivisions could truly enhance the image and quality of Davis’s streets and bikelanes.

Ring Greenway

Create public access for community and noncommercial open space and recreational uses (e.g., community gardens, urban forests, and biking, jogging, hiking, or equestrian trails) on periphery of the urban area.

Plan for completion of Davis as a city surrounded by agriculture and open space uses, rather than a continuously expanding segment of a metropolitan area in which all cities eventually are expected to grow to meet their neighbors.

Where feasible, create open space between urban and agricultural uses

to provide a visual edge.

In order to allow efficient cultivation, pest control, and harvesting methods to be employed on agricultural land, require those property owners wishing to develop to provide a buffer or other means of mitigating the adverse effects of urban development on adjoining agricultural land.

1987 Davis General Plan

The 1987 Davis General Plan clearly states that a buffer “ring” around the urbanized area is a long-range goal. However, the actual plan shows some areas that are not protected as open space buffer, which means that the open space around the city would be fragmented and therefore less accessible and successful. The idea of a Ring Greenway is exactly what the General Plan calls for, but it will probably be the most controversial element of the greenway because it departs somewhat from the General Plan. As shown on the greenway plan, the Ring Greenway is made up of many different elements, including the University Arboretum, the drainage swales and ponds in West Davis, the North Fork of Putah Creek as it runs through South Davis, and the drainage channel in North Davis.

While the greenway plan follows the General Plan in most instances, there are two areas in particular that deviate from the General Plan—the portion north of Covell and west of Route 113, and the area north of the Mace curve to Road 105. The main reason for this alteration was discovered in a discussion with Thomas Lumbrazo, the Community Development Director for the City of Davis. He intimated that the creation of large tracts of open space along Covell Boulevard west of Route 113, and along Mace Boulevard, would be unacceptable because of the amount of work that is scheduled to occur along these two stretches of road over the next several years. Widening

of the roads, new sewer systems, and the costs involved in completing these will override the need for open space along these newly improved streets. As a response to his reaction, the Ring Greenway was relocated north, creating more of an identifiable and contiguous ring around the north side of the city.

Many different types of open space, from agricultural lands to biking and hiking trails to wildlife habitat, could be implemented in the Ring Greenway element of the Davis Greenway. Because of its proximity to future development, some care must be given in the specific planning of areas so that wildlife habitat is protected adequately while still allowing for many different types of activities, such as picnicking, biking, jogging, nature study, or horseback riding. The drainage swales and ponds that exist in this element of the greenway offer some of the best habitat and nature study opportunities in close proximity to Davis, as does the riparian corridor of the North Fork of Putah Creek in South Davis. These two habitats are wonderful opportunities for environmental education, passive recreation, and other nonintrusive forms of leisure. Other types of activities, from more typical forms of recreation like soccer, to others like Frisbee® golf, could be accommodated in certain, limited areas. Still other options for innovative land use, such as the sale or lease of land within the greenway area (with a conservation easement and a public access clause attached) for use as small-scale organic farms, tree farms, vineyards, or stables, are currently being discussed. The continuous ring of publicly accessible open space that would be created adjacent to the limit of current and proposed (within the next two to five years) development offers permanent open space close in to the center of Davis, open space that could become an *interior* ring if (or, more correctly, when) development “jumps the garden wall,”

guaranteeing those residents currently living adjacent to open space continued access, both physically and visually, to large open spaces. It was this type of long-range vision that created the great parks of the late nineteenth century, such as New York's Central Park and San Francisco's Golden Gate Park, both of which were located on the distant outskirts of the city at the time of their creation.

Connector Greenways

Connector Greenways play a key transitional role in the overall scheme of the Davis Greenway. They serve as an extension of the Greenstreets concept, except that they are farther from the core of the city and have more of an opportunity to exist in a naturalized state. The Connector Greenways can assume several forms. One form could be a strip of undeveloped roadside (Road 99 to Woodland), where a trail built alongside the road has a negligible impact on wildlife while improving the access and safety for greenway users. Another form could be a drainage swale (the swale that runs from the I-80 overpass to the South Fork of Putah Creek along the property line of the university) that offers a less improved, more natural landscape that approaches “habitat” more closely than the roadside does. Whatever their character, Connector Greenways serve several main purposes, among which are 1) creating a linkage between the city, the Ring Greenway, and the Natural Habitat areas in the Willow Slough and Putah Creek reserves, and 2) providing wildlife corridors to offer cover, food, and habitat as the animals move about. The latter, wildlife corridors, are similar in concept to the idea of “browseways” utilized by the U.S. Forest Service to provide improved habitat and cover for wildlife, particularly deer. This approach is one of the central ideas of the greenway system—not only

does it provide linkages and opportunities for recreation, but it also provides habitat for many types of wildlife at the same time. This idea is consistent with the environmental image Davis wishes to portray. The city could profit from it economically, culturally, and environmentally.

Natural Habitat Areas

Require development to be set back from creeks and channels where wildlife habitats exist. Limit activities within the setback area to trails and other uses that would not affect the adjacent natural habitat area.

Encourage the University to preserve natural habitat areas on campus.

Encourage management of storm-retention ponds, drainage ponds, channels, and other appropriate areas as wildlife habitats.

1987 Davis General Plan

The Central Valley of California, once home to a myriad of wildlife, is now struggling to provide enough habitat for the comparatively few number of indigenous animals that still inhabit the area. The amount of wildlife habitat that has been lost over the years is staggering. For example, before humans arrived in California wetlands habitat comprised over five million acres in the Central Valley alone; today, there are approximately 86,000 acres left, or just under 2% of the original amount, according to Ducks Unlimited. Many other important habitats have gone this way as well, including riparian corridors, of which the South Fork of Putah Creek and the Willow Slough are prime examples. "The statewide threat to riparian habitats . . . is acute; less than 1% of California's historic riparian vegetation remains intact" (U.S. Department of the Interior, 1980, p. 83).

In response to this threat, the city of

Davis can act to preserve much of the existing riparian habitat along the two corridors mentioned above by incorporating them into the greenway plan. The city has currently finished a report outlining the method to be utilized in expenditure of the \$2.1 million committed to Davis from Proposition 70 solely for the purchase of "riparian, wetlands, and potential wetlands habitat." Proposition 70, passed overwhelmingly in June of 1988, allocates over \$70 million for use in the preservation, acquisition, and reclamation of open space and wildlife habitat throughout California. Approved by over 70 percent of the voters, money will be raised through the sale of state bonds and will then be distributed to different cities and other government entities.

The process for Proposition 70 land acquisition outlined by the city of Davis is the first real step in preserving open space with an overall strategy, the Davis Greenway, in mind. Putah Creek and Willow Slough, as well as the smaller habitats provided by drainage channels and ponds, are home to many species of animals found nowhere else in this area. In fact, riparian habitats have more avian species diversity than any other habitat type, and there are several endangered species that live in these habitats as well, such as the Swainson's Hawk and the Giant Garter Snake. Unfortunately, most of the habitats that raptors like the Swainson's Hawk prefer are the same areas that humans prefer as well. As a result, the raptor species residing in these areas must be carefully considered and evaluated as to their response towards human activity. During the spring egg-laying and incubation periods, this situation is especially crucial. Many raptors will abandon their clutch if disturbed too much. However, this locality could present an excellent working laboratory for raptor research by groups such as the U.C. Raptor Center for the Davis Audubon Society. By identifying specific nesting locations, areas

of the greenway in close proximity to the nest could be cordoned off, or activity in these areas could be restricted. Signs could help in this area as well, serving to protect the nesting animal while also educating the public about wildlife environment. This is a basic approach in conservation education: providing a learning experience that the people benefit from now, while the environment benefits both now and in the future. Both the Willow Slough and the Putah Creek habitat areas can provide this combination of education and preservation.

An opportunity for open space and habitat preservation may be afforded in the near future with the creation of the Willow Slough Regional Park. This park will be much different than traditional "lawn and trees" park. This park will be a *habitat* park, with facilities for hiking, biking, picnicking, and nature study. When completed, it could serve as a model for other areas where natural habitat may be combined, even enhanced (by providing more resources utilized in range and habitat management), by its exposure to low-impact, passive forms of leisure and recreation.

THE GREENWAY: DAVIS AND BEYOND

Imagine walking out your front door, getting on a bicycle, a horse, or a trail bike, or simply donning your backpack, and within minutes of your home, setting off along a continuous network of recreation corridors which could lead across the country. . . . Greenways are your vehicle for this imaginary trip of the future, reaching out from communities all across America to link cities, towns, farms, ranches, parks, refuges, deserts, alpine areas, wetlands and forests into a vast and varied network of open spaces.

Americans Outdoors, p. 142

The Davis Greenway has the potential to become the hub of a larger, more extensive system covering the northern valley and foothill areas, and, looking far into the future, possibly connecting up to a regional, or even national, system of open space. While this idea may seem far-fetched, a regional open space network may be more realistic than one might realize. Currently, there exists a bike trail that parallels I-80 from Davis to West Sacramento. This trail then links up in West Sacramento with a trail that leads to the American River Parkway, which contains some 30 miles of bike lanes and trails between West Sacramento and Folsom. If the linear miles of the parkway were combined with the distance between West Sacramento and Davis and the linear miles contained in the Davis Greenway (not including Greenstreets), the result would be in the neighborhood of 95 linear miles of trails. A small example when the implications of a national greenway system are considered, but it is a start.

The Davis Greenway could begin to link areas of the Central Valley together, utilizing open space and trails to provide the framework for a truly regional recreational resource. The park would, in essence, extend to everyone's front porch. Using the greenway, one could travel from a home in Davis, stop by the Farmer's Market on the way out of Davis, ride the bike trail to West Sacramento, pick up the American River Parkway, and arrive at Folsom Lake. Not only is this an enjoyable recreational resource, but it also serves to preserve open space and wildlife habitat. The benefits of such a regional system, expanding existing trails to create an open space system rather than a system of bike lanes, would be astronomical, both in economic terms and in quality of life, especially in an area whose growth rate far exceeds the national average. As the Sacramento metropolitan area continues its rapid pattern of growth, the

issues of quality of life and open space preservation will only become increasingly important.

IMPLEMENTATION

The city of Davis is at a critical point in its history. The transition from small town to urbanized setting brings up many critical questions concerning patterns of growth, ultimate size, and community image. Throughout this discussion concerning the Davis Greenway, it has been shown how well the concept of a greenway fits Davis's current situation in helping to provide a framework for a carefully thought-out and ecologically sensitive long-range development plan for both the city and the university. By combining the open space resources of both entities into an overall conceptual plan, both the students and the citizens of Davis will benefit, as will the city and the university.

A question now arises however—a question concerning the conversion of what seems like an idealistic dream to many into a reality. How could a greenway be implemented in Davis? There are many conservation alternatives that could be successful in any given situation; however, there are some that have proven to be more successful than others. For the city of Davis, several opportunities exist that could make the Davis Greenway a reality.

First, there is an existing Land Trust in Davis that could work with the city to protect and preserve the necessary open space outlined on the proposed conceptual plan. The Land Trust, as a nonprofit organization exempt from taxation under Section 501 (c) (3), can provide cost-effective and non-governmental alternatives to development for private landowners, while also protecting and preserving open space and/or habitat. Methods such as conservation easements have proven extremely effective nationwide, protecting over two million acres of land to

date. The Davis Rural Land Trust could be an effective mechanism in acquiring open space land for the greenway.

With the passage of Proposition 70, the city of Davis, as previously mentioned, is scheduled to receive \$2.1 million for the acquisition of wetlands and riparian habitat. These funds could provide the beginnings of a greenway or open space fund for the city. Proposition 70 illustrates that the outdoors is important to the citizens of this state, and that they are willing to pay for its protection. In the survey on recreation in Davis, furthermore, 93 percent of those surveyed said that they would support the greenway in some way, and of those, 61 percent said they would approve a small greenway tax, and 53 percent indicated that they were in favor of a bond issue to raise revenue for the greenway. This would seem to indicate that the public sector in Davis believes in the concept of a greenway, and that they would be willing to pay for it.

Other alternatives might be to apply for a Community Development Block Grant (C.D.B.G.) for open space acquisition, or to work with private interest groups such as the Sierra Club, the Nature Conservancy, Ducks Unlimited, the Rails-To-Trails Conservancy, or the Audobon Society in a fund-raising or sponsorship manner. Corporate funding could also be sought. There is a limited amount of federal funds (aside from the C.D.B.G.) at this time; however, this situation could change if the American Heritage Trust Bill passes. There are several federal and state agencies that can help, such as the Rivers and Trails Assistance Program of the National Park Service, the Bureau of Land Management, and the Department of Fish and Game. The Yolo County Flood Control District has also expressed interest in designing its next project, a drainage channel north of Davis, in conjunction with the greenway efforts currently under way, incorporating native

vegetation and public access instead of concrete channels into the design.

When the greenway finally is on the verge of becoming a reality, the community should be given the opportunity to help in the construction of the various portions of the system. This idea has been extremely successful in other communities, serving to foster a sense of ownership of the greenway. Since the Greenway Plan's introduction in July 1988, there have been several public hearings and one successful community involvement is the real key to any successful greenway system. All the hard work, research, and time spent on developing a greenway system will be for nothing if the citizens do not feel that they were allowed any input into its development. And if they do not use it, it could be lost to development in a much shorter time than it took to create.

CURRENT STATUS OF THE DAVIS GREENWAY

The idea for the creation of an extensive open space network first took shape in the fall of 1987. The junior author and Kerry Dawson, Professors of Landscape Architecture at U.C. Davis, began to formulate a plan for a multi-layered system of open space extending from the center of the city out to the agricultural lands and riparian habitats that surround the city. In the winter and spring of 1988, the senior author began to research the feasibility and potential of this system. This study culminated in June with the completion of a written proposal and plan for the Davis Greenway (available from the Center for Design Research, Department of Environmental Design, U.C. Davis, Davis, California 95616), in which the Davis City Council quickly became interested. In July, a public hearing was held to discuss the status of open space in and around Davis, during which the Greenway Plan was presented to the City

Council by the senior author in a slide presentation. The plan was subsequently sent to the city's staff for further study, which culminated in a second public hearing devoted solely to the Davis Greenway in November. Attended by approximately 100 people, the public wholeheartedly embraced the idea, and strongly encouraged the city to include the greenway concept in its General Plan.

Since that time, the Davis Greenway has been at the center of discussions in the numerous city commissions and task forces dealing with open space planning, where they are recognizing the advantages offered by utilizing open space and wildlife habitat as the framework for proposed development, rather than creating numerous developments with disjointed and unrelated open spaces and habitats. The city has just recently hired a full-time intern to spearhead the greenway effort on the city's behalf, while the *Friends of the Greenway* has taken up the job of public education and citizen involvement. The result has been an increasingly large coalition of environmental groups, businesses, citizens groups, and city government officials working toward the preservation of open space and the inclusion of the Davis Greenway into the City's General Plan, which is being proposed by the City's Park and Recreation Department sometime during the fall of 1989, upon completion of the updated open space element.

The Greenway Plan has also attracted regional and national attention recently. In 1989, the plan received planning awards from the American Society of Landscape Architects and the Sacramento Valley Chapter of the American Planning Association. In addition, the California State Trails Commission has passed a resolution supporting the plan, and the National Park Service's Rivers and Trails Assistance Program has also offered a letter of support in favor of the creation of a greenway in Davis. This

recognition should help facilitate support for implementing the Greenway Plan.

SUMMARY

The citizens of Davis value open space and recreation, wildlife habitat, and the environment. Unless some decisions are made fairly soon by both the city and the university concerning the preservation of open space and habitat in the future, however, the opportunity will expire, not to be offered again. The idea of a Davis Greenway, even though not a new concept in open space, can set a framework for open space in the future that is both visionary and flexible. The plan is visionary in that it can provide for the needs of many future generations. It is flexible in that the overall plan is meant to respond to changes in need and recreational use patterns. These are all critical factors which indicate that a greenway for Davis could be a viable idea—now and into the future.

The idea of the Davis Greenway can now go one of three ways. It could be forgotten, debunked, or thrown away as a pipe

dream that could never happen. The idea could be the subject of debates and discussions over the coming years, possibly until it becomes too late or infeasible to accomplish. Finally, it could be picked up and further developed into a more concrete plan of action, aiming for actually implementing such a system. This last option is the one to choose if open space, habitat, quality of life, and city character are important. The third option is also a challenge—a challenge to those who care enough about the future development of Davis, and of cities in general, to apply the concept in practice. It is a viable idea, possibly a timeless idea, and it should be passed on to other professionals, communities, and citizens so that they can make their choice as well.

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BIBLIOGRAPHY

- Alexander, Christopher, et al. *A Pattern Language*. New York: Oxford University Press, 1977.
- Boston Foundation. *The Greening of Boston*. Boston: Center for Public Service, 1987.
- California Trout, Inc. *Habitat Disturbance and Recovery*. San Luis Obispo: California State University, 1981.
- Committee on Agricultural Land Use and Wildlife Resources. *Land Use and Wildlife Resources*. Washington, D.C.: National Academy of Sciences, 1970.
- Diehl, Janet, et al. *The Conservation Easement Handbook*. Alexandria, Virginia: Land Trust Exchange, 1988.
- Gehl, Jan. *Life Between Buildings*. New York: Van Nostrand Reinhold, 1987.
- Gold, Seymour. *Recreational Planning and Design*. New York: McGraw-Hill, 1985.
- Hough, Michael. *City Form and Natural Process*. New York: Van Nostrand Reinhold, 1984.
- Jensen, Clayne R. *Issues in Outdoor Recreation*. Minneapolis: Burgess Publishing Company, 1972.
- Jones, Stanton. *Recreation in Davis Survey*. 1988.
- Maryland Department of State Planning. *Outdoor Recreation and Open Space Concept Plan*. 1970.
- Nash, Roderick. *Wilderness and the American Mind*. New Haven: Yale University Press, 1967.

- National Academy of Sciences. *A Program for Outdoor Recreation Research*. Washington, D.C., 1969.
- National Park Service. *The Riverwork Book*. Washington, D.C., 1987.
- Nicholson-Lord, David. *The Greening of the Cities*. London: Routledge & Kegan Paul, 1987.
- Office of Planning and Research, State of California. *Planning For The Fun Of It*. Sacramento: Office of Planning and Research, 1982.
- People For Open Space/Greenbelt Alliance. *Reviving the Sustainable Metropolis*. San Francisco, 1989.
- President's Commission. *Americans Outdoors*. Washington, D.C.: Island Press, 1987.
- Shoemaker, Joe. *Returning the Platte to the People*. Denver: Greenway Foundation, 1981.
- Spirn, Anne Whitson. *The Granite Garden*. New York: Basic Books, Inc., 1984.
- Trancik, Roger. *Finding Lost Space*. New York: Van Nostrand Reinhold, 1986.
- U.S. Department of the Interior. *Habitat Guides for Birds of Prey*. 1979.
- U.S. Department of the Interior. *Important Fish and Wildlife Habitats of California*. 1980.
- U.S. Department of the Interior. *Western Reservoir and Stream Habitat Improvements Handbook*. 1978.

Suburban Parkway Development in Waukesha County, Wisconsin: A Midwestern Case Study

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INTRODUCTION

The parkway movement in America is typically associated with the preservation and development of large-scale (state or regional) linear parks oriented toward or along rivers or mountain ranges. These parkways, which usually include a scenic roadway, serve to protect and display unique natural and cultural resources. Some parkways, such as the Blue Ridge Parkway in Virginia and North Carolina, are owned and managed by the National Park Service. Other parkways, such as the Glen Canyon Parkway in Colorado, are owned and managed by individual state transportation departments. However these parkways might be owned or managed, all have been designated and protected because

of their national or state significance as unique natural and/or cultural resources.

Increased urban and suburban development in metropolitan areas has put pressure on decision-makers who want to preserve and develop adequate recreation and protected natural areas, but still promote economic development within their communities. These decision-makers recognize the need for their community to grow, while acknowledging their responsibility to provide better services for inhabitants. They are aware of the importance of preserving environmentally sensitive areas, as well as of maintaining a healthy environment within their community. The planners also recognize the need to provide quality park and conservancy lands to meet future as well as

existing needs. Finally, local decision-makers are realizing the need to develop guidelines and ordinances to implement these requirements.

Local Parkway Issues

Economic development and park and conservancy preservation and development can be realized at the community level through the comprehensive planning process. By identifying and preserving prime environmental resources, suburban communities can protect them from incompatible adjacent development and still allow for orderly community growth in other suitable areas. Many existing local parks and conservancy (natural preserve) areas, as well as other prime environmental resources, are located within identified environmental corridors in the community. These environmental corridors usually are located along rivers, streams, and lakes, and they generally are proximate to the site of the historic origin of the community. These natural groupings of existing park and natural areas; community, historic, and cultural resource areas; and prime environmental resources are ideally suited for the development of local parkways or linear parks.

Some state and federal decision-makers have recognized the importance of preserving these environmentally sensitive lands locally. There are a number of state-mandated regulations requiring the preservation of various categories of sensitive environmental resources, such as wetlands. There are also a variety of grant-in-aid programs that provide incentives to acquire and preserve prime environmental resources, and there are incentives to acquire and develop quality recreational lands at the local level, too. Finally, there are several programs that assist in preparing plans and training municipal employees to manage their community's environmental resources.

Developing parkways locally can be an effective means of preserving prime environmental resources, as well as providing adequate park and recreation facilities to a suburban community. Numerous communities in the United States have developed local parkway systems along environmental corridors. Boston, Massachusetts, and its surrounding suburban communities are good examples of such environmental preservation and park development. This paper will discuss the efforts of one such community, Menomonee Falls, Wisconsin, to implement a local parkway program.

Background on Planning

Considerable research has been conducted on community development, environmental preservation, and park and recreation planning by a variety of public and private agencies throughout the United States. This information is available to local decision-makers in order to help them evaluate existing conditions and formulate new policies for managing community growth. Many state and federal agencies have used the information generated by this research to develop programs that help municipalities plan for their future and help them insure orderly community growth. Several of these programs include grants-in-aid, which are used for planning, acquisition, or development of park systems and protected natural areas. These programs act as incentives for municipalities to plan for their future park and preservation needs.

Environmental Corridors

Extensive research on the character and value of environmental corridors has been conducted at the University of Wisconsin—Madison and other places. Environmental corridors were first identified in the late 1960s by Professor Phil Lewis, Jr. Professor Lewis's research concluded that approximately 95

percent of the significant environmental resources of an area are linear, usually situated along streams, rivers, lake edges, and wetlands. His research also showed that by preserving these environmental corridors, a majority of an area's prime environmental resources could be protected. Many county and local governments in Wisconsin and elsewhere have subsequently identified the environmental corridors within their jurisdictions, and they have protected them under their zoning ordinances. The Southeast Wisconsin Regional Planning Commission (SEWRPC) has identified environmental corridors in the village of Menomonee Falls, and the village, in turn, has protected them from development under its zoning ordinance.

Comprehensive Outdoor Park and Recreation Planning

Most municipalities and counties in Wisconsin and other states prepare Comprehensive Outdoor Recreation Plans (CORPs) to plan for the recreation and preservation needs of their communities. In addition to being an effective, systematic means of planning for the recreational needs of a community, the preparation of a CORP is required by Wisconsin state government in order to qualify for Land and Water Conservation (LAWCON) or Acquisition and Development of Local Parks (ADLP) grants-in-aid. LAWCON and its state counterpart ADLP are the major grant programs available to purchase and/or develop park lands preserves. State regulations require that the CORP be updated every five years in order for the municipality to remain eligible for the grant-in-aid programs.

Urban Forestry

The state of Wisconsin provides several incentives to municipalities to manage and improve the quality of their urban vegetation. These programs are administered in several

ways under the heading of urban forestry:

1. Grants-in-aid to municipalities to prepare urban forestry management plans, prepare tree planting plans, train municipal urban foresters, and adopt municipal tree ordinances.
2. Technical help from state forestry experts.
3. Enabling legislation to create community forests, including demonstration areas, municipal nurseries, conservancy areas, timber management areas, and qualification for forestry aids.

These programs are available to municipalities to improve the quality of their urban environment in general and of their urban forests specifically.

Grant-In-Aid Programs

The State of Wisconsin, as well as the U.S. government, has a variety of grant-in-aid programs available to municipalities to help them improve the quality of their park and conservancy systems. Most of these programs have requirements regarding comprehensive planning, public use, and environmental preservation or improvement. The state has concluded that these various grant-in-aid programs act as an effective incentive for municipalities to plan and implement programs that satisfy community recreation and conservation needs.

Park land acquisition and development, normally funded through local budgets, affects local property taxes. Given the current high cost of municipal services and the trend to try to lower taxes in general, municipalities are usually faced with the task of trimming local budgets to hold the line on expenses. This attitude usually results in park and recreation projects being deferred or eliminated, and park maintenance being deferred.

Both state and federal government agencies have recognized this trend, and

they have tried to help local communities afford these projects. Generally, the grants from grant-in-aid programs are provided on a matching-funds basis for important projects within an area. Most funding agencies rank the grant requests according to the following priorities: 1) acquisition of prime environmental resources, 2) land for new parks, 3) facilities development with a regional impact, 4) facilities having year-round use, and 5) facilities with local impact.

Funding agencies have found that these grants stimulate park development. Many local officials find that once they receive a park development grant, private individuals and service groups are eager to donate the funds necessary for the local match. In this manner, many administrators are realizing that state and federal grants act as an incentive for local park development.

Land Use Controls

Under the police powers authorized by most state governments, local ordinances can be passed or modified to require a developer to dedicate a set percentage of a proposed development as park land or to require that the developer provide urban street trees for each new lot platted. Furthermore, these ordinances can be designed to allow the municipality either to choose which area in the development project it wants for recreational purposes or it can specify that the developer can make a payment in lieu of park land dedication, if the community doesn't need a new park in the area. Other local ordinances can be passed to prohibit development of prime environmental corridors or to require that individual property owners remove diseased or nuisance trees on their land to protect urban vegetation in the area.

Many states have legislation that restricts local development in the interest of environmental protection. Wisconsin, for instance, has legislation that defines noxious

weeds and requires their removal and legislation that protects prime agricultural lands, wetlands, and historic resources.

A CASE STUDY: MENOMONEE FALLS, WISCONSIN

The village of Menomonee Falls is a typical midwestern suburban community. It has an area of about 33.4 square miles and a population of about 27,000, and it is situated due west of the major inland port city of Milwaukee in Waukesha County. Menomonee Falls is connected to Milwaukee and other surrounding communities via an ever-expanding highway network. SEWRPC has studied development trends in the area and has concluded that significant physical growth will be occurring in Menomonee Falls and other suburban communities surrounding Milwaukee.

Historical Perspective

Historically, Menomonee Falls has developed in a manner similar to many other small communities in the area. In the mid-1850s, entrepreneurs from Milwaukee migrated west and established a lime kiln operation to supply lime to various Milwaukee businesses. The operation was sited along the Menomonee River near one of the many limestone deposits. In addition to being near a source of raw materials, this site was chosen because of its proximity to the Menomonee River, which was used as a power source and water supply. The lime kilns were constructed on the west side of the river, approximately 50 feet from a small waterfall. This waterfall, the "Falls of the Menomonee River," gave the new community its name.

Homes were built near the kiln operation, and more businesses were developed in the area to serve the growing population. Many of the homes and businesses were located north of the lime kiln operation and

along the Menomonee River. This area, along what is now Main Street, developed into the community downtown.

Eventually, the lime kiln operation and a nearby grist mill became obsolete and were abandoned, but community development continued along the Menomonee River. New businesses were built, new homes were constructed, and the village continued to grow. The abandoned lime kiln site and mill pond were purchased and developed as the beginnings of the local park system. As time went on, the community continued to purchase and develop park and conservancy lands in a piecemeal manner. Most of these parks were designated and developed because of their nearness to community residents and the Menomonee River. Today, most of the urban sections of the village of Menomonee Falls, as well as the majority of village-owned park and conservancy lands, lie within one mile of the Menomonee River.

Development Problems

A growing urban population, improved transportation networks, and an increasing trend of homeowners relocating from central cities to suburban areas have created pressure on Menomonee Falls decision-makers to develop the suburban community even further. Economic competition for prime development land around metropolitan Milwaukee has caused a rapid increase in housing, commercial, and other related land uses in Menomonee Falls. This development has spurred the growth of the local economy and has increased the property tax base, but it also has created a variety of new problems.

Often, suburban development in Menomonee Falls has occurred at the expense of important resources. Housing developments and subdivisions were frequently located in prime agricultural areas, and commercial and industrial developments were situated along major roadways and typically included

large paved parking areas to serve their clients and employees. These parking areas, along with the new roadways and other improvements associated with suburban development, have increased storm water runoff and the chance for surface- and ground-water pollution. Also, increased suburban development has usually meant increased numbers (and use) of automobiles and trucks and an associated increase in noise and air pollution.

Generally, competition for prime development land around Milwaukee results in the overdevelopment of housing and commerce at the expense of land uses having lower direct economic value such as agriculture, recreation, and preservation. Even though community development and a growing community population both increase the need for more park and recreation land in Menomonee Falls, developers have been unwilling to dedicate areas for park and recreation due to the high development value of the land. Developers have been reluctant to provide any amenities, such as street trees, landscaping, or sidewalks, since these items would reduce their return on investment. To fulfill their park land dedication requirement under the village subdivision ordinance, some developers have attempted to designate and dedicate storm water detention basins required by village ordinance, as park land. As a result, the village has accepted some storm water detention facilities, several that are unusable and even unsafe, as community recreation facilities.

Solving the Problems

As in many other small community governments, decision-makers in Menomonee Falls recognized the problems facing their community. They realized that community growth in Menomonee Falls was inevitable and that proper planning and management were necessary.

In early 1988, the Menomonee Falls Village Board contracted with the consulting firm of Foth and Van Dyke and Associates of Wisconsin for the preparation of a Comprehensive Outdoor Recreation Plan and an Urban Forestry Plan. Both of these plans were completed and adopted as official village planning documents in late 1988. Since their adoption, these plans have served as development guidelines for Menomonee Falls.

The Menomonee Falls CORP was expanded beyond state requirements to include a discussion of recreational issues important in the village, park master plans for each of the village park and conservancy areas, and an inventory and capital improvements program for village schools that had outdoor recreation facilities open to the public.

Goals and Objectives

A list of goals and objectives was prepared to establish the overall framework for the development of the CORP. The ultimate goal of CORP is to "[e]stablish a Village-wide system of parks, open space and recreational facilities that will economically provide Menomonee Falls residents of all ages with adequate, convenient, and high quality recreational opportunities on a year-round basis." Other goals articulated the need to maintain adequate active and passive recreational lands, provide adequate facilities at all parks in the system, stress the need to preserve environmentally sensitive and historically significant areas, and establish a village-wide urban forestry program to manage vegetation on village land. Examples of supporting objectives include: encourage the use of natural features such as floodplains, wetlands, and woodlands as passive recreation areas; replace old, deteriorating recreation equipment at all village-owned parks; establish an ongoing tree planting and tree maintenance program; and secure

additional lands along the Menomonee and Fox River environmental corridors to ensure public control. The goals and objectives provide the framework for the recommendations to be made in the action plan, and, in essence, represent the heart of the CORP.

Community Profile

A community profile was prepared to analyze present and future growth trends in the community. Generally, Menomonee Falls's population will decline slightly over time, due to a decrease in household size, but housing and commerce will expand because more people will purchase homes in the community. Also, the profile determined that the amount of agricultural land in the village was decreasing, while land devoted to housing and commerce was expanding. Finally, the profile showed that community residents had a higher-than-average income, and that the housing stock in the village was newer than the state average. These last two factors are indicators of the trend toward increased suburban development.

Inventory of Existing Park Lands

An inventory of existing park, recreation, and conservancy lands in Menomonee Falls indicated that the community has a wide variety of facilities available to its residents. The inventory showed that most of the land along the Menomonee River is owned by the village and managed as park or conservancy areas. An analysis of the inventory and a comparison to National Park and Recreation Association (NPRA) standards reveals several interesting points:

1. The village has a large amount of park land, but some areas are not served by parks.
2. The village basically has the recommended number of appropriate recreational facilities to meet current

and future needs.

3. Most of the recreational facilities are in good condition, but some need repair or replacement.

Recreational Issues

The Statewide Comprehensive Outdoor Recreation Plan (SCORP) was used to identify some general recommendations for park and recreation improvements. Other improvement suggestions were made by local officials and interest groups. Finally, public hearings were held to obtain input from the general public. Several important issues came out of this process:

1. The public was in favor of preserving the environmental corridors.
2. The public wanted more hard-surface trails for walking, cycling, pushing baby carriages, etc.
3. The public wanted more quality park facilities near their homes.

Action Plan

The final step in the preparation of the Menomonee Falls CORP was the Action Plan and its associated capital improvements program. Generally, this process involved combining the desired improvements identified through public input with improvements identified as desirable according to the SCORP, and repairing or replacing obsolete or deficient facilities as determined in the inventory of existing facilities.

The capital improvement program (CIP) provides costs and implementation dates for the improvements identified in the action plan. Improvements are ranked for implementation according to their importance and priority in the overall CORP, generally as follows:

1. Improvements to existing facilities
 - a. correct health and safety hazards

- b. upgrade deficient facilities

- c. modernize adequate but outdated facilities

2. Install new facilities as deemed appropriate through community input
3. Install new facilities as deemed necessary through comparison to NPRA standards and the SCORP

When taken as a whole, these capital improvements represent the implementation plan for the entire CORP. By grouping and prioritizing certain capital improvements, specific CORP recommendations can be constructed. The highest priorities in this plan have been identified as the acquisition of land to complete the Menomonee River Parkway system and the construction of a hard-surface trail system along it.

Urban Forestry Plan

The leaders of Menomonee Falls decided to prepare an Urban Forestry Plan as a means of managing the urban tree population, maintaining the overall environmental quality of the community. They viewed the plan as an integral component of the process of identifying and preserving the community's prime environmental resources. The urban forestry plan was prepared concurrently with the CORP and contains recommendations that are based on some of the CORP's Action Plan.

The final recommendations of the urban forestry plan include trimming one-sixth of the community's urban trees each year, planting about 100 new trees each year to maintain a viable urban forest, monitoring urban trees to locate problems and treat them, hiring new staff to perform urban forestry duties, and removing dead or dying trees and stumps in a safe and timely manner.

Implementation

Implementation of the Menomonee Falls

CORP and Urban Forestry Plan is being accomplished using two methods. Certain recommendations of each plan are administered through existing ordinances or codes, while capital improvements identified in the action plans will be authorized and funded through specific governmental action.

The Village of Menomonee Falls applied for a Wisconsin ADLP matching grant to construct a multi-purpose, hard-surface trail along the village-owned portions of the Menomonee River Parkway. The project ranked high in the list of all proposed projects requesting funding and received a \$50,000 grant award. Since the award was announced, numerous individuals and service groups have donated approximately \$25,000 to the village for use in matching the state grant. Village officials, excited about the grant, hope to apply for more funding to implement more of the CORP recommendations. By continuing to implement the recommendations of the CORP, the village will be able to acquire and develop the balance of the Menomonee River Parkway within five years.

SUMMARY

Suburban development trends in Menomonee

Falls, Wisconsin and elsewhere pose numerous challenges to planners and local officials. Land acquisition and the development of local parkways is an ideal method of protecting prime environmental resources and providing adequate recreational facilities for local populations. These parkways usually contain the most significant natural and cultural resources in a community. Some developers will argue that park and parkway dedication will increase development costs, thereby hindering community development. However, park and parkway development add to the quality of community life and should help increase surrounding property values.

Comprehensive planning is an effective method of identifying important natural resources while accommodating economic development within the local community. Numerous state and federal grant-in-aid programs can provide matching funds and act as incentives to park development. Comprehensive Outdoor Recreation Plans, such as the one prepared for Menomonee Falls, can serve as excellent models for the development of local parkways in other suburban areas.

BIBLIOGRAPHY

- Lewis, Philip H., Jr. Madison E-Way System (unpublished report). Madison: University of Wisconsin, 1971.
- Skidmore, Paul E. Comprehensive Outdoor Park and Recreation Plan—Village of Menomonee Falls, Wisconsin. Madison, Wisconsin: Foth and Van Dyke and Associates, 1988.
- Skidmore, Paul E. Urban Forestry Plan—Village of Menomonee Falls, Wisconsin. Green Bay, Wisconsin, 1988.

Texas Urban Waterways: Lessons in Linear Park Planning

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There is something about rivers, no matter how small or useless for commerce, that fascinates men and attracts the affairs of men to them. It's not just a matter of drinking water or power to turn millers' wheels, as economists would have you think. It is almost as if a river were in fact, as well as simile, an artery of the community through which its lifeblood courses.¹

Recreation and preservation of important ecosystems are probably the most common reasons for establishing linear parks along waterways in towns and cities. Community beautification with greenbelts and provision of hike-and-bike trails as alternative transportation systems may also be factors. In some cases the impetus for a linear park may come from a developer's donation to a city of an unbuildable floodplain.

Constructing the trail, placing picnic tables and benches, and erecting a few signs may be thought to be enough to create a linear park. However, a more focused approach is needed if these waterways are to be viewed as the "lifeblood" of the community. The waterway's relationship to the community's origin, the landforms surrounding the stream, and the vegetation and its seasonal characteristics may suggest ways to make a city's linear parks a unique reflection of the community. The relationship of the stream corridor to the built environment and cultural life of the community are other factors. Understanding these and other distinctive factors will assist in planning linear parks that reflect the natural surroundings and cultural life of the community. Such parks will enhance the community's quality of life.

This paper will examine some of the

factors that apply to developing parks along rivers and streams so that they will "attract the affairs of men to them." Case studies of urban linear parks in central Texas will be presented, followed by an analysis of identity factors as they apply to these parks.

DISCUSSION

According to Roman belief, every being had its *genius*, or guardian spirit. From this comes the notion of *genius loci*, the essence of a being or place or what "it wants to be." Place may be defined as a space with a distinct character. From this an individual can develop orientation and identify with the environment.²

The relationship between humankind and nature is the key to this orientation, according to Kevin Lynch. Many factors work against the human connection with the web of life, even the communities in which we live. But it is this connection that gives the deepest meaning to places. All human settlements have features of value and richness but often "we fail to appreciate the importance of place to our quality of life."³

In his writings on nature and humankind, Rene Dubos points out that some landscapes may be dominated by humans; in others, nature dominates. In either case there is a "persistence of place" that cannot be destroyed by either human activity or the passage of time because the spirit of place represents forces hidden beneath the surface.⁴ These "stubborn peculiarities" will affirm the identity of place no matter how extensively it has been damaged or altered.

[There is] a spatial and textural relationship between rocks, water, soil, and slopes, despite rough handling by

*real estate developers; a characteristic luminosity or poetic melancholy of the air despite the smog; an overpowering mood of the season that air conditioning cannot eliminate, the continuing evidence of historic landmarks even where monuments have been destroyed. It is the persistence of these characteristics that intrigues people who return to their village, city, region, and gives them the thrill of instant recognition. Whether the thrill be one of pleasure, bittersweet nostalgia, or overwhelming sadness, the visitor senses that the physical location is not only an environment but a human place as well.*⁵

However, Harry Garnham, in *Maintaining the Spirit of Place*, writes that loss of a place's distinctive images results in the breaking of the "essential bond between person and place, with a subsequent tangible loss in the basic quality of life."⁶

Defining the features of the notion that each place has a definable spirit or identity, Garnham's work listed "components of identity" as follows:

1. **Physical Features and Appearance.** The actual physical structure of a place. Its buildings, landscape, climate, and aesthetic quality.
2. **Observable Activities and Functions.** How a place's people interact with it, how their cultural institutions have affected it, and how the buildings and landscapes are used.
3. **Meanings or Symbols.** A more complex aspect, primarily the result of human intentions and experiences. Much of a place's character will be derived from people's reaction to its physical and functional aspects.⁷

The relationship between human societies and water has existed for thousands of years. Cities are said to have originated

along the rivers of Egypt and Mesopotamia. The opportunities and problems of the river environment—transportation, irrigation, and flooding—developed communication and cooperation between inhabitants. According to Lewis Mumford, "[t]he very conditions that made large urban settlements a physical possibility also made them a social necessity."⁸ Because of the historic relationship between rivers and cities, it seems appropriate that they should have active roles in establishing community identity.

Urban activity has made indelible marks on the waterways in the cities and towns of central Texas. Development has caused flooding, channel erosion, and sedimentation. Urbanization, bridge construction, and channel straightening and lining have destroyed riparian communities and have limited access to and along the waterways. However, some cities have developed memorable linear parks with or without these changes. Others are now under construction. The potential for still more remains.

CASE STUDIES

Plano

Plano has developed a linear park system that reflects the city's motto "Building a Community of Pride Through Cooperation." It is a suburban community of 121,000 located about 15 miles north of Dallas. In 1972, when the population was approximately 25,000, the city and the Plano Independent School District had a master park and school plan prepared.

Today, there are parks and schools on shared sites throughout the city. The joint facilities create more expansive public open spaces than would be possible if each were separately sited. Linear parks link schools and neighborhoods with playgrounds and other parks. Such a system reminds one of Frederick Law Olmsted's view of the city as a landscape that should be "aired with a



Figure 1. Big Lake on Spring Creek in Plano. The Chisholm Trail extends into the distance. Elementary School is at far right center.

whole constellation of parks, linked together in an integrated system.”⁹

There are 27 miles of trails in the linear parks system. The Bluebonnet Trail traverses an east-west power line easement for four miles, intersecting with the four-mile Chisholm Trail along Spring Creek (Figure 1). Together, these trails link eight parks, five schools, a library, and several neighborhoods. The creek is dammed to form a lake near one of the elementary schools. Although they are not all linked, Plano’s other linear parks have similar features and are evenly distributed across the city.

These linear parks reflect their prairie environment. They typify the open character of the Blackland Prairie on which this city, Dallas, and Fort Worth are situated. Native trees are limited to the channel edges. None of the native grass remains; plantings of prairie grass and wildflowers could enhance these parks. The linkages are more than physical and visual. They give a sense of continuity to the neighborhoods and public

facilities and enhance the quality of life of this city.

Arlington

Arlington was not founded on the Trinity River but on one of its tributaries, Johnson Creek. The creek is heavily urbanized, with little remaining open space. In fact, it has flooded so many times that the city and Corps of Engineers are readying plans for bridge and channel improvements. It is an unfortunate example of what results in the absence of integrated planning for the preservation of watercourses. However, with the construction of River Legacy Parks on the Trinity River, the city is recognizing its environmental heritage and participating in the development of the Trinity River greenbelt. River Legacy Parks will offer the residents of this city of 250,000 their first public open space along the Trinity.

Except for some farming and sand and gravel mining, this site is largely undisturbed. The bottomland hardwood forest of elm,

oak, cottonwood, hackberry, and willow along the banks of the river offers visitors a glimpse of the native setting. No trees have been destroyed by channeling and levying such as in Fort Worth. Most of the park is in the flood plain and is being constructed to withstand occasional inundation.

The park's 375 acres were assembled from several donations of land from corporations and individuals. More is being sought to complete the Arlington portion of the linkage between Dallas and Fort Worth. The River Legacy Foundation was formed to promote the park and to raise funds for future improvements. (The \$2.6 million for the first phase was provided from city bond funds and from state and federal programs.)

Four miles of paved paths wind along three-and-one-half miles of riverfront. Several overlooks have been constructed, including a wooden deck that was built by the executive club of a local aerospace business. Use of materials and design is noteworthy here. Native stone is used on the columns at the park entry, the custom-built picnic tables, picnic shelter columns, and paving on the river overlooks. The standing-seam metal roofs on the structures are reminiscent of the roofs of early Texas farmhouses.

The park's 151 acres of wilderness will provide a quiet and nearly pristine respite for citizens of a city that is best known for its large amusement parks (Six Flags Over Texas and Wet'N Wild) and major league baseball team (Texas Rangers). Besides the trails and foot paths, the park will provide picnic facilities, playgrounds, canoeing, interpretive signage, and a great lawn for informal games and large gatherings. A privately funded nature center for research, education, and interpretive activities will also be built here. The formal dedication and opening are scheduled for April 1990, and a Riverfest to be cosponsored by the Foundation and the Junior League has been scheduled for June 1990.¹⁰

Austin

Texas's capital city straddles the Gulf Coastal Plain and the Balcones Escarpment. The geological change here provides many of the topographic and hydrologic features that give Austin such an attractive setting. Rugged limestone hills wooded with native juniper rise above the Colorado River, which flows through the city. The river has been dammed in several places for recreation, flood control, and hydroelectric production. Town Lake in Austin is the lowest reservoir and has ten miles of shoreline with 754 acres of dedicated park land. Greenbelts have also been preserved on several of the city's streams that flow into the Colorado.

Town Lake reflects Austinites' historic concern for the environment, citizen involvement, and community cooperation. The more than 3,000 trees and shrubs planted along the shoreline were financed by citizens and businesses. (Lady Bird Johnson, who makes her home nearby in Johnson City, was honorary chair for the project.) Many bordering businesses and hotels have provided landscaping and trail linkages to the park (Figure 2).¹¹ Tree-line Congress Avenue forms a strong connection between the Capitol and the lake. Austinites treasure their viewpoints along the lake; some of these vistas are protected by ordinance.

Lakeside and park facilities include boat ramps, canoe and sailboat rental, the Auditorium Shores Amphitheater, and eight-and-one-half miles of jogging and bike trails. The restored Buford Fire Tower, which has been fitted with a carillon to announce the passage of time, is an historic landmark on the north shore of the lake.

Several tributary creeks have distinctive natural features, including springs, pools, shelter caves, bluffs, and interesting vegetation. One of these, Shoal Creek, is lined by a greenbelt that winds north for three miles from Town Lake through medical, business, and residential areas before ending at Seider



Figure 2. Congress Street bridge crossing of Town Lake. Path and steps in foreground connect hotel to jogging trail.

Springs Park. It was laid out in 1933 by the Civilian Conservation Corps.

Barton Creek Greenbelt provides a wilderness experience within 15 minutes of downtown. Nearly eight miles of footpaths traverse the bluffs and canyons of this corridor. Several trailheads have been constructed between Zilker Park and Loop 360, with future ones planned beyond the loop. This creek also flows into Town Lake. A vine-covered gazebo with a view of the city's skyline marks the point of confluence.

The Waller Creek Walkway provides the opposite kind of experience with its mile of paved walks, tunnels, and limestone retaining walls. The creek winds along the east side of downtown before flowing into Town Lake.

In all, this city of 400,000 has some 25 miles of trails along its natural greenbelts. Most of them connect with Town Lake, helping to focus Austin on one of its greatest natural assets. A 1976 master plan called for a city-wide greenbelt trail system and future

expansion along every major creek in the city. The city's total park system encompasses 10,000 acres. The early planners were determined to save some of Austin's natural beauty. It was one of the first cities to have a comprehensive park plan, completed in the 1920s.¹²

The tradition of citizen action and comprehensive planning continues. When citizens believed the Town Lake was threatened in 1984 by high-density projects, tall buildings, and a proposed convention center, they formed the Town Lake Task Force. The task force produced the *Town Lake Corridor Study* in October 1985. This led to the preparation of the *Comprehensive Plan for Town Lake* by Johnson, Johnson & Roy, landscape architects and planners.

San Antonio

Perhaps the oldest and best known of Texas's linear parks is the Paseo del Rio, or River Walk, in San Antonio. Rising from ground water a few miles north of downtown near

Brackenridge Park, the river loops through the city before flowing 125 miles southeast of to the Gulf of Mexico. Poet Sidney Lanier found the river the “most entrancing aspect” of a city in which he found many attractions.¹³ In spite of its obvious appeal, the river was nearly lost to a reclamation project. After a disastrous flood in 1921, the city cut a channel between the ends of the oxbow that is now the central part of the River Walk (Figure 3). With most of the flow diverted, businessmen saw the potential for creating buildable land above the old channel. A group of the city’s women organized and successfully lobbied against the plan. This group was the forerunner of the San Antonio Conservation Society, which was formed in 1924.

Local bond funds and assistance from the federal Works Progress Administration enabled the city to construct flood control gates and bridges and to deepen the channel to improve its flow. Access stairs, walkways, and rock retaining walls were built, and lighting and plantings were added. The WPA funds also made construction of the river amphitheater possible. The River Walk was revitalized and expanded for the 1968 HemisFair World’s Fair. The opening of the Rivercenter retail, office, and hotel complex in 1988 marked yet another extension.

Now, old mingles with new, knit together by the river, the large trees and bright flowers along its edges, and the nearly constant activity. The river attracts residents and tourists alike. It has been called the “essence of San Antonio. This . . . river is what visitors remember and natives keep going back to.”¹⁴ The plants give a tropical feeling and increase the feeling of intimacy. Cafés and bars invite one to stop for refreshment. Small barges are available for a ride or a meal on the river. Activity doesn’t stop at sundown. At night, the lighted River Walk takes on another life, with music ranging from mariachi to country and western drifting from the clubs.

The central part of the River Walk, the River Bend section, is about one and one-half miles long (Figure 4). Ten to 15 feet above walkways, the bridges carry the downtown traffic back and forth across the river. The Alamo, one of several missions the Spaniards built along the river, is about a block away. La Villita (Little Village), a restoration of San Antonio’s earliest residential settlement, is also nearby. Several major hotels front on the river, including one in an old convent.

The walks extend both north and south of the busy River Bend area into quieter sections. In the King William Historic District to the south, the river flows in a concrete-lined floodway. Here the walks are about ten feet above the river. They are heavily landscaped, with views of downtown and connections into the neighborhoods. The

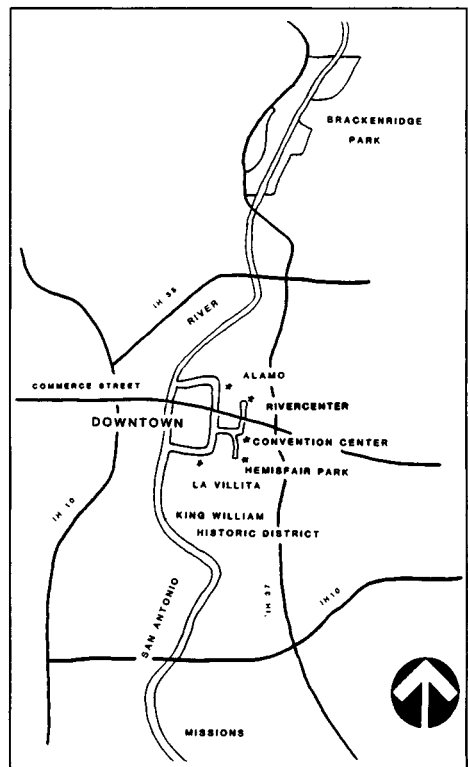


Figure 3. San Antonio River.

historic Army Arsenal, now the corporate headquarters for a grocery chain, is a major presence in this area.

The cosmopolitan character of the city is reflected in the variety of activities along Paseo del Rio. The Fiesta de las Luminarias at Christmas is held during two weeks in mid-December. The river is lit with candles in paper sacks and strings of lights in the trees. Las Luminarias symbolizes lighting the way for the Holy Family. Local choirs sing carols along the river. Other festivals and events include St. Patrick's Day festivities when the river is dyed green, and Fiesta Noche del Rio and the Ballet Folklórico de San Antonio at the Arneson River Theatre, which feature traditional Mexican and Spanish music, dance, and drama.

ANALYSIS

It is the way humans sense the interplay of the natural and built environments that gives a sense of place. Although individual reactions vary, there is a universal recognition of the most memorable of places. In the urban realm, one thinks of Santa Fe, San Francisco, and New Orleans. The "fit" between the natural and the built environment, together with events and activities, gives these places their uniqueness, the "instant recognition" to which Dubos refers.

Harry Garnham's work, referred to earlier, concerns identification of small-town uniqueness. However, the criteria listed previously can be applied to any component of the physical environment, including linear parks. Following is an analysis of the linear parks discussed above and ways in which they meet or fail to meet aspects of the criteria.

Physical Features and Appearance

Included in this category are items such as unique setting, architectural style, craftsmanship, and use of local materials. While all communities have features of "value and richness," as Lynch says, the natural landscapes of some have more distinctive visual qualities. Compare, for example, the scenic values of Austin's Hill Country setting and Plano's prairie setting. Their built environments differ too. Austin has a distinct urban environment, and Plano's is clearly suburban. The park systems reflect their respective natural settings. Arlington also has a relatively unchanged natural environment



Figure 4. River Bend area of Paseo del Rio has sidewalk cafés and pedestrian bridges.

in its River Legacy Parks.

The use of local materials and native plants in Waller Creek Walkway is noteworthy. Throughout Austin and San Antonio, the indigenous limestone has been used for paving, steps, retaining walls, and drinking fountains. In Arlington the native sandstone is used.

Architectural style contributes to the character of the River Walk in San Antonio. Although there are a variety of styles, the Spanish Colonial structures reflect the ethnic heritage of the community. These structures include the Arneson River Theatre and La Mansion Hotel.

Observable Activities and Functions

The interaction of people with place—how they use it—is one of the components of identity. Several of the parks demonstrate the value and importance of citizen involvement in fund raising and park construction. Events such as Riverfest in Arlington are river-related activities held in the parks to raise funds to improve greenbelts. Volunteers constructed a park feature at Arlington's River Legacy. Surely a sense of ownership results from such direct participation.

San Antonio and Austin's Waller Creek demonstrate the importance of pedestrian traffic in highly urbanized settings. At Paseo del Rio, the constant human activity is the key to its success. Waller Creek, however, has not achieved the purposes for which it was designed because pedestrian traffic is lacking.

Linear parks are rightly regarded as being passive. They are places for walking, bird watching, fishing, nature study, and other unstructured activities. Such activities help to connect one with the web of life to which Lynch refers. The parks in Plano, Arlington, and Austin are particularly well suited to this activity. Spring Creek in Plano seems especially appropriate for the time-honored childhood pursuits from which memories are made.

Meanings or Symbols

A place has meaning to the people who experience it. Cultural diversity, individual values, and memories affect human reaction to places. The variety of Austin's linear park system seems to reflect the variety found in the makeup of the community as well as its strong sense of the natural environment. Town Lake, with its satellite greenbelts around which the town is organized, projects the image of fit between the community and the environment. Plano's linkages may not be readily apparent to the casual observer, but its greenbelts give the city a special quality to its residents and visitors.

Unlike most linear parks, San Antonio's is dominated by humans and their artifacts. The community's cultural diversity is apparent and provides an added level of uniqueness. Of the cities discussed here, San Antonio is the most closely associated with the river in its daily and seasonal activities. As such, the river has come to symbolize the city.

CONCLUSIONS

Park planners and city officials are learning how much linear open spaces can do for their communities. The lengthy edge view gives the impression of more park than there actually is. The trails within these parks offer flexibility in recreation: walking, jogging, cycling, skating. The linkages that Frederick Law Olmsted envisioned can include connections to public facilities, historic landmarks, viewpoints, and, of course, other trail systems. Beyond that, landmarks, seasonal events, and community-wide activities seem to make these spaces more successful, for they draw people into the parks. Higher levels of activity will also increase park security.

Retail, restaurants, and other

commercial activity should not be overlooked, but the San Antonio River Walk should not be the model for every mixed-use linear park. Rather, planners should explore their locales to find both the obvious and the hidden features to highlight.

Sensitivity to the natural and cultural features of a community and thoughtful planning can produce memorable parks along urban waterways. These waterways will then become the lifeblood of the community, increasing the sense of place, and improving the quality of life.

NOTES

1. Green, 1946.
2. Norberg-Shulz, 1980.
3. Lynch, 1976.
4. Dubos, 1980.
5. Dubos, 1972.
6. Garnham, 1985.
7. *Ibid.*
8. Mumford, 1961.
9. Sweek, 1988.
10. Aghamalian, September 1989.
11. Zelade, 1984.
12. Mumford, 1961.
13. Green, 1946.
14. Foster, Fairbank, 1988.

BIBLIOGRAPHY

- Aghamalian, Faye, Administrative Aide, River Legacy Foundation, September 1989. Personal communication.
- de la Chevallierie, Hildebert, April 1989. "Integrating Waterways & Walkways," *Parks & Recreation*, Vol. 24, No. 4.
- Dubos, Rene, 1980. *The Wooing of Earth*. New York: Charles Scribner's Sons.
- Dubos, Rene, 1972. *A God Within*. New York: Charles Scribner's Sons.
- Foster, Nancy Haston and Ben Fairbank, Jr., 1988. *San Antonio*, 2nd Ed. Austin: Texas Monthly Press, Inc.
- Garnham, Harry Launce, 1985. *Maintaining the Spirit of Place, A Process for the Preservation of Town Character*. Mesa, Arizona: PDA Publishers Corporation.
- Green, Peyton, 1946. *San Antonio—City In The Sun*. New York: McGraw-Hill Book Company, Inc.
- Lynch, Kevin, 1976. "Enhancing the Visual Environment," *The Environment of Human Settlements, Human Well-Being in Cities*, P. Laconte, Editor. Proceedings of the Conference held in Brussels, Belgium, April 1976. New York: Pergamon Press.
- Mann, Roy, 1973. *Rivers In The City*. New York: Praeger Publishers.
- Mumford, Lewis, 1961. *The City In History*. New York: Harcourt, Brace & World, Inc.
- Norberg-Shulz, Christian, 1980. *Genius Loci: Towards a Phenomenology of Architecture*. New York: Rizzoli International Publications, Inc.
- Sweek, Suzanne Christian, 1988. *Rush Creek Trail: A Linear Park Prototype*. Master's Thesis, University of Texas at Arlington.
- Zelade, Richard, 1984. *Austin, The Complete Guide to Texas Capital City*. Austin: Texas Monthly Press.

IV. Environmental Considerations

Greenways: Recreation Resource versus Land Use Ethic?

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OVERVIEW

Last week I viewed the end of an NBC television program entitled "Yesterday, Today and Tomorrow" in which an astronaut was asked to describe photographs he had taken of the Earth during two Space Shuttle flights flown in the last five years. Most of the photographs showed the destruction of Earth's natural resources: the wholesale clearing of tropical rain forests in Brazil, pollution in Tokyo Bay and in the Pacific Ocean off of Los Angeles, the loss of valuable water resources as massive lakes around the world dry up, and noticeable soil erosion occurring in Ethiopia from poorly managed lands. The final question asked of viewers was, "What kind of world will our children and grandchildren inherit?"

This is probably not the first time you have heard about the degradation of the Earth's ecological systems. Nor is this the first time that questions have been asked regarding land use ethics and stewardship. It seems that daily we are reminded of the tremendous impact that humans have on Earth's natural environment. We are aware of world-wide overpopulation, global warming, destruction of valuable forested lands, depletion of surface and ground water supplies, air pollution, and pollution of earth's most precious resource—the oceans. But what can we as individuals do to resolve these problems?

As a nation, the United States embodies all of the conflicts being created by a growing, urbanizing world. Since the founding of this nation, Americans have thought of the United States as a vast, unconquerable landscape, with plenty of land for every person, and for every type of use. But as we grow, at the rate of 2.2 million

people each year, we realize that much of the water we drink, the air we breathe, the food we eat, and the shelters we call home have been or are being severely affected by the waste products of a growing nation. Competition for limited space is common in the United States, and now that we live closer to each other, we can no longer escape the fact that the urban growth and development of one community affects the lives of people who live in another.

In fact, the American way of resource exploitation, capitalism, and limitless growth, the principles which have enabled the United States to achieve the status of a "world leader," are threatening the environmental processes necessary to sustain the delicate structure for all life on this continent. Perhaps the President's Commission on Americans Outdoors (PCAO) summarizes the current status of our outdoor resources best, stating that "[o]pen space, wildlife and wetlands are being lost, often because their value does not register in the economic calculus of development." So how can we as Americans create greater value in our nation's outdoor resources, before they are lost forever?

The *Blueprint for the Environment*, a document that was assembled through the cooperative effort of America's environmental community, provides President Bush with 700 recommendations regarding the most critical national and international environmental concerns. The primary purpose of this report was to define the basic responsibilities the United States faces in the coming years: "Our future is at stake. We face critically important choices: whether to take the actions necessary to ensure the livability of our planet or to stand by and watch the decline of the natural systems on

which all life depends. . . . *If we fail to act, we can't expect others to do so.*"

I believe that the environmental problems of the world, of our nation, and within our communities are so overwhelming and complex that many Americans feel frustrated and assume that they have no significant role to play in solving these problems. But each of us *can* have a direct role in shaping the environment in which we live. Through support of a new land use ethic that provides for the wise management and use of our natural resources, I believe individuals can make a difference. Individuals must become self-educated to the environmental problems of our growing, urbanizing world; we should support the conservation of environmentally critical landscapes to protect essential ecological systems, and we should act to implement new land use programs that encourage balance between man's land use requirements and nature's requirements.

I believe that the best way to resolve global problems is to establish a new attitude at the community level. One land use product that best defines this new attitude is greenways. Greenways define an ethic for the proper use and management of our environment. Today, I will address the need for greenways as a product of wise land use management. I will define greenways in terms of both recreation and the environment, and I will present the need for a land use ethic. Finally, I will present the future vision of greenways, not as a recreation resource, but as a land use planning tool which all communities should adopt as a vital component of their comprehensive land use planning process.

GREENWAYS BY DEFINITION

The greenway concept is not easy to define or to understand fully, because it means many things to different people. The

President's Commission on Americans Outdoors defines greenways as "corridors of private and public recreation lands and waters [which] provide people with access to open spaces close to where they live, and [which] link together rural and urban spaces in the American landscape." Simply put, greenways link people with natural resources. They are a multiobjective land use planning tool that conserves and protects the natural environment, and at the same time provides for the successful integration of humans into this environment.

The use of the term "greenway" dates back to the 1920s. However, greenways as a land use product in the United States date back to the late 1800s when landscape architect Frederick Law Olmsted was designing and implementing open space systems and linear parks in New York City and Boston. Today, perhaps unfortunately, the term "greenway" is often associated with recreation, public access, and public use. I say unfortunately because greenways provide people with more than just close-to-home recreation. As a functional land use component, greenways conserve the natural environment and help protect the delicate ecological systems of native landscapes.

GREENWAYS AS RECREATION COMPONENTS

As a recreation component, greenways provide opportunities for individual and group, active and passive recreation. Greenways also link neighborhoods with local school systems, providing children with a safe transportation alternative; greenways provide a quiet, peaceful setting for persons in urban areas, offering the opportunity to escape the pressures of urban life; greenways provide a living laboratory for students of all ages, supplementing classroom education with hands-on experience; and greenways

offer Americans a safe, defined area for exercise and physical fitness, an essential component for a long and healthy life.

A nationwide study recently completed by American Trails indicates that increasing numbers of Americans are using the outdoors with greater frequency. One hundred million of us walk for pleasure, fitness, and exercise; 61 million ride bicycles; 29 million jog; 17 million ride horses; 15 million use canoes and kayaks; and countless other participate in other motorized and nonmotorized activities that make use of linear corridors of land.

In the late 1960s, much was made of the fact that all Americans would enjoy shorter work weeks and more leisure time by 1985. The big issue then was, "What will people be doing with all of this leisure time?" Predictions hailed that the average work week would be 22 hours, leaving 18 hours more leisure time available. Another prediction was that the average American could afford to retire at age 38.

In fact, April 24, 1989, issue of *Time* magazine documents that we are losing more and more leisure time every year. According to a recent Harris survey, the amount of leisure time enjoyed by the average American has shrunk 37% since 1973. Over this same period of time the average work week has jumped from 41 hours a week to 47 hours a week. Now most of us are lucky if we will ever be able to retire comfortably.

Greenways are becoming an essential component of many local recreation strategies, solving the need for close-to-home recreation in urban areas. Most people can no longer afford the time, nor the expense, to travel long distances for vacations. The days of the two-week family vacation are going the way of the nuclear family. Greenways also provide greater recreation potential for the average citizen because their linear form provides greater perimeter and more frequent access to the

resource. Many recreation activities can be best accommodated within linear corridors. Linking different facilities together with greenways is also a way to create more efficient use of those facilities.

GREENWAYS AND THE ENVIRONMENT

But the greatest benefits that greenways provide to urban communities have yet to be fully realized. Greenways are more than just people-oriented spaces. By their nature, greenways can preserve vegetation, filter sediment and pollution from erodible or poorly managed adjacent lands, help to control water and air pollution, protect wetlands, and conserve wildlife habitat.

Perhaps the greatest benefit which greenways provide to urban areas is in absorbing flood waters. In 1973, a tremendous flood engulfed Crabtree Valley Mall in Raleigh, North Carolina. The shopping mall, second largest in the state, had just been completed, and suffered over \$2 million in flood damage. Damage to the mall was so swift and severe it demonstrated that there should be no further urban development within flood-prone areas. The city had been studying the concept of greenways for years and finally had the economic incentive to create a city-wide greenway system. Today, the Capital Area Greenway System is a model of success, with over 900 acres of floodplain land available for public use and 30 miles of multi-surface trails that link the community together and maintain the city's green image. Flood waters are now being absorbed in natural landscape buffers that line many of the creeks and streams in the Raleigh metropolitan area.

Wetlands are often regarded in disparaging fashion as swamps. They are generally disliked by people because they smell funny, contain a diversity of wildlife that human beings don't particularly care

for, and are located within landforms generally regarded as undesirable. However, wetlands should be highly regarded, for they are the birthplace for many ecological systems upon which much life depends. Wetlands serve numerous environmental functions, from providing habitat for waterfowl to recharging the aquifers from which we draw our drinking water. Greenways are an excellent method for protecting wetlands, and for providing people with access to these unique environments.

The issue of protecting wildlife habitats is more serious than we may think. Increasing urbanization of America's native landscape is forcing some species out of their natural habitat. Even more seriously, we are cutting off migration routes and confining some species to parcels of land too small for successful habitation. Greenways provide corridors not only for wildlife habitat, but also for migration, and they may in time become the primary areas where a majority of wildlife take refuge from humans' urban intrusion.

WHY WE NEED A LAND USE ETHIC

The need for an ethic that governs the way in which we use and manage land is not a new concept in the United States. A land use ethic has been discussed since the signing of our Constitution. Most recently, the President's Commission on Americans Outdoors defined the need for a land use ethic stating: "We need a new appreciation of air, land, water, and all living things. As America grows more urban, . . . [there is a] risk that we will lose touch with nature. To value the natural world we must become . . . a part of it."

Since World War II, urban and suburban development in the United States has proceeded without ethical regard for the environment. In fact, our current land use

ethic dictates that all land units should be developed to their *highest and best use*—a use that best suits the individual interests of the property owner. Our land development strategies have been motivated by profit, greed, malice, and the absence of understanding of the impact that an individual has on ecological systems.

What should be our ethical definition for the use and management of land, and what is a land use ethic? The President's Commission on Americans Outdoors defines a land use ethic as "a personal involvement in the outdoors as an essential part of life. It includes statesmanship, courtesy for others using the outdoors, and stewardship; our *obligation* to ensure future generations enjoyment of our natural heritage . . . an outdoor ethic reflects pride in our country."

We have lost pride in our country, we are losing touch with our outdoor environment. Americans have recently been criticized for being overweight and overly dependent on a mechanized, technological lifestyle. We've engineered our lifestyle into complacency. This criticism is justified. Many Americans ride around in luxurious, air-conditioned automobiles, commuting long distances to work, shopping, and entertainment areas. We work in office buildings and live in homes that have little or no relationship to the natural environment. Most of our urban landscapes are cluttered with human inefficiency. We are turning most of our built environment into Anywhere, USA, mass producing "sameness," living in a McDonald's world.

We have lost the ability to give our communities a sense of identity, not only in the United States, but increasingly in other parts of the world as well. And as our distinctive landscapes disappear, those that remain inherit a greater value. Our rural landscapes are being transformed into suburbs, the family farm has all but disappeared, and our once rural-oriented

lifestyle has changed to an urban lifestyle. For many Americans, the natural, undeveloped landscape has become a symbol of an earlier, simpler lifestyle.

And not only are we losing touch with our natural environment, but the by-products of our new urban lifestyle are contributing to more pollution and degradation of the Earth's natural environment. If we are to reverse our poor land use practices, better understand our environment, and change our collective lifestyle, we must adopt a new ethic for the way we use land, one that every American can understand and implement.

ACHIEVING A LAND USE ETHIC

How can we achieve a land use ethic in a country as large and diverse as the United States? I believe the reason that earlier attempts to adopt a national land use ethic have failed is because we have not had a land use *product* associated with the cause. Greenways can become the physical representation of a land use ethic. Greenways represent a land use product that embodies the complete definition of a land use ethic while offering all Americans a product that they can see, touch, feel, and smell. Greenways are real, they are close to where we live and work, and they are "do-able."

Successful greenways all have one thing in common, they have been born out of successful partnerships between the public and private sectors. One of the central themes of the PCAO was the need for new public-private partnerships to protect the nation's resources and implement projects at the local level. Greenway planning and design are based on a unique "bottom-up" approach, which seeks to unite not only resources of the natural environment, but also the people of a community.

As a land use product, greenways should become a mandatory part of all urban

comprehensive plans for municipal, county, state, and federal lands. We routinely plan for roads, water, sewer, television and electrical services, new housing, industrial sites, places to shop, dine, and entertain but not for the conservation of our native landscape. We need to integrate greenway planning into the growth management strategies of our modern technological society. Greenways need to be thought of as a necessary component of our urban infrastructure.

In order to implement this bold initiative we will need leadership. While I strongly believe that the role of government should be de-emphasized, and the role of the individual should be emphasized, I also realize that our nation has always looked to national leadership to accomplish its major goals. Defining and implementing a national land use ethic is a formidable task that can only be achieved with national leadership.

President Bush has stated that stewardship shall be a top priority of his administration. The President has unveiled a ten-point agenda for the use and management of America's public lands and natural resources. His major points are:

1. Be good stewards of our natural resources.
2. Enhance political, economic, and social development of our neighboring countries.
3. Place a high priority on educating the public to ensure appreciation and support for our natural resources.
4. Adopt an aggressive policy and fight an international war on drugs.
5. Implement a new "America the Beautiful" campaign.
6. Manage our natural resources in a responsible, efficient, and ethical manner.
7. Manage our natural resources for multiple use.

8. Apply scientific research to national and international problems, such as water and air quality, global climate change, acid rain, and biodiversity.
9. Promote public policy through harmony rather than confrontation.
10. Encourage the formation of partnerships between governments and private sector and implement the President's "thousand points of light"—the varied, voluntary, and unique organizations within our nation of communities.

The President's plan represents a progressive step toward the implementation of a land use ethic; however, the actions of the President are more important than his words.

CONCLUSION: THE NEED FOR GREENWAYS

Do we really need greenways? The greatest need for greenways is within and around our metropolitan areas, where eighty percent of all Americans will live by the year 2000. Greenways can provide a tangible solution for improving the quality of human life in urban areas by fostering the kind of community spirit, activism, and bonding between local citizens that is presently being lost as our metropolitan areas grow larger.

Greenways appeal to all age groups, both sexes, all races, and all nationalities.

For many Americans, the "outdoor environment" is a place to hunt, fish, participate in organized sports, jog, ride a bike, or sun bathe. The outdoor environment is something we use, until we are tired of using it. My greater vision for greenways is not just as a recreation resource for the citizens of the United States, but as a vehicle to promote an outdoor ethic—for the wise use and management of our natural resources.

Greenways can provide every American with the opportunity to experience nature, to become self-educated to the complex and interconnected environmental processes, to foster a more comprehensive understanding of people's relationship with the natural environment, and to develop a sense of pride and accomplishment, all so that we can improve the quality of life for ourselves today, and ensure that the resources we have enjoyed will also be enjoyed by future generations of Americans.

In closing, I would like to share with you a slogan which was adopted by the Capital Area Greenway Commission in 1974 as it sought to define what greenways meant to its community. "*To leave for our children what our grandparents enjoyed as children . . . trees, streams, and that quiet place from which to draw strength.*"

BIBLIOGRAPHY

- Americans and the Outdoors*, National Geographic Society, Washington, D.C., January 1987.
- "The Consequences of Global Warming for Biological Diversity," by Pamela S. Cubberly, *World Wildlife Fund Letter*, No. 5, 1989, pp. 1-8.
- A Cooperative Approach to Landscape Preservation: The Greenline Planning Process*, by Richard A. Paik, University of North Carolina, Chapel Hill, N.C., 1987.
- "Corridors of Green," by Jane Rohling, *Wildlife in North Carolina*, Vol. 52, No. 5, May 1988, pp. 22-27.
- "Earth's 'Cosmic Shock,'" by Robert C. Cowen, *The Christian Science Monitor*, Vol. 80, No. 183, August 16, 1988, p. 17.
- "Facing the Population Issue," by Lester R. Brown, *World Watch*, Vol. 1, No. 6, November/December 1988, p. 2.
- "Greenways," by Gilbert M. Grosvenor, *Land trusts Exchange*, Summer 1987.

"Greenways Across America," *Land Trusts Exchange*, Summer 1987, pp. 10-11.

Investing in Park Futures: Executive Summary, National Parks and Conservation Association, Washington, D.C., 1988.

"Keynote Address," by Charles A. Flink, *Dedication of North Chickamauga Creek Greenway Preliminary Master Plan*, Chattanooga, Tennessee, June 1989.

"The Legislative Landscape—Vol. 1," by Ian McHarg, *Landscape Architecture News Digest*, Vol. 30, No. 7, July/August 1989, p. 7.

"Making Greenways Happen," by Charles E. Little, *American Forests*, January/February 1989, pp. 37-40.

Outdoor Recreation in a Nation of Communities: Action Plan for Americans Outdoors, U.S. Government Printing Office, Washington, D.C., July 1988.

"Public-Private Partnerships and Greenways," by Charles A. Flink, *State Parks in a New Era—Meeting the Challenge*, Conference Proceedings, Hershey, Pennsylvania, June 1989.

Report and Recommendations to the President of the United States, President's Commission on Americans Outdoors, Washington, D.C., December 1986.

"Survival and Stewardship: Perspectives on the Future of the Landscape Architect's Profession," by Robert W. Ross, Jr., *Landscape Architecture News Digest*, Vol. 30, No. 3, March 1989, pp. 3-5.

"Wise Use Environmentalism," by Darryl Harris, *Our Land*, Vol. 1, No. 1, Spring 1989, pp. 4-5, 78.

The Role of Parkway in Barrier Beach Preservation: A Study of Contrasts on Long Island, New York

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Early in his career, Robert Moses became concerned with the paucity of recreational opportunities for the people of New York City. Upon his appointment as president of the newly formed Long Island State Park Commission in 1924, Moses set out to rectify the situation. Almost immediately he recognized the recreational potential of Long Island's barrier beaches and noted:

There are miles of oceanfront beaches now inaccessible except by small boat. If the islands between them and the mainland were bridged by an adequate parkway thousands of acres could be made available to public use.¹

In addition to providing access, however, Moses was determined to avoid the

unplanned development that was then prevalent along the barrier beaches to the west of Jones Beach. These areas, developed in the late 1800s and early 1900s as a result of their proximity to New York City,² were awash with ticky-tacky structures, signs, and other eyesores, giving the barrier beaches an aesthetically unpleasant appearance. Thus, Moses, "instead of building an ordinary road . . . lined with all kinds of objectionable shacks and signs . . . planned to build a parkway with infrequent access."³ Moreover, these parkways would be:

more beautiful than any roads the world had ever seen, landscaped as private parks are landscaped so that they would themselves be parks . . . so that even as people drove to parks,

*they would be driving through parks.*⁴

Moses also insisted on a right-of-way of unprecedented width, along with the provision that the Long Island State Park Commission would review all proposed zoning changes within 500 feet of any state park or parkway boundary. This enabled the Long Island State Park Commission to control land use effectively on adjacent property. In this way the Commission could prevent the aesthetically insensitive development so common at the boundaries of many national parks.⁵

To assure the integrity of his concept, Moses became involved in virtually every detail of parkway planning, design, construction, and landscaping. The bridges, gas stations, police depots, and maintenance buildings would be constructed of dressed granite and roofed in copper or slate. By day, recreation-seekers would drive through well landscaped ribbon parks lavishly planted with indigenous trees and shrubs. The curvilinear roads would enhance scenic vistas and visual interest. By night, homeward-bound motorists would travel along roadways lighted by quaint iron lamps hung from wooden poles.⁶

Moses's first parkway, the Southern State, was begun in 1927. Shortly thereafter construction began on the Wantagh State Parkway, which was to extend southward from the Southern State, span the Great South Bay and provide access to Jones Beach State Park, which was also under construction at that time. With these massive construction efforts in their early stages, Moses developed his initial plan for the Ocean Parkway in 1927.^{7,8} It would extend over shifting sands and changing inlets from Jones Beach State Park eastward to Fire Island Inlet.⁹

The popularity of Long Island's state parks in general and Jones Beach in particular was unprecedented. By 1930, attendance reached 3 million, in contrast to the attendance of 3.4 million that same year at *all* of the nation's national parks.¹⁰ Undoubt-

edly, much of the popularity of Long Island's state parks was due to the ease of access over Moses's carefully designed ribbon parks. This popularity gave Moses the impetus to expand the intended scale of the Ocean Parkway.

And so, in the autumn of 1930, with only the first few miles of Ocean Parkway constructed on Jones Beach, Moses proposed that it be extended to the eastern-most tip of Long Island's south fork. It would span Fire Island to the east. The parkway would then run the entire length of Fire Island and Westhampton Beach to return, via causeway, to the mainland at Hampton Bays. From there it would continue to Montauk State Park.¹¹

At that time neither Fire Island nor Westhampton Beach was an island. Rather, the entire barrier beach system was one long sand spit attached to the mainland at Southampton some 50 miles to the east of Fire Island Inlet. Only when a March storm in 1931 formed Moriches Inlet and detached Fire Island from Westhampton Beach did Fire Island become a true island. Seven years later, the infamous hurricane of '38 severed Westhampton Beach from the mainland to form Shinnecock Inlet.

The major mainland access to this barrier beach was via its point of attachment at Southampton. A road, of sorts, extended westward toward Moriches Inlet long before Moses planned the Ocean Parkway. Originally this road was probably used by local fishermen and land-based whalers. It also provided access to Life Saving Service stations located along the barrier beach. Later, beach cottages began to spring up along Westhampton Beach beside this early road.

Moriches Inlet had periodically formed, shoaled, and closed long before Long Island's discovery. Indeed, the Indian name for this area is Cupsogue, "the place of breaking through of inlets."¹² As a result of the transitory nature of Moriches Inlet, the only true access to Fire Island, even before it

separated from the mainland, was by boat. Thus, development initially began in the vicinity of the boat-docking areas. Off-the-road vehicles were unheard of in those early days. Even today, Fire Island is roadless but, due to off-the-road vehicles, hardly autoless. As on Jones Beach, limited access was a key component of the eastward extension of the Ocean Parkway.¹³ Unfortunately, however, the Fire Island-Westhampton Beach segments were never constructed. Moses was thwarted three times in this endeavor, twice in the 1930s on economic grounds, and once again in the 1960s by the embryonic environmental movement.

And so the die was cast. Without a limited access parkway there was no feasible way to control development on a barrier beach in private ownership. At Westhampton Beach, with its roadway, development could occur anywhere. Development could also occur easily on Fire Island because the postwar use of off-the-road vehicles has made the entire beach a road with limitless access. Since these vehicles can go and carry building materials anywhere, homes began to spring up everywhere. Houses built on dunes destroyed them. Homes were also built behind the disappearing dunes. When there was no more room for residences on the island, the bayside salt marshes were filled in and bulkheaded, and more homes were built.

Undeveloped land on Fire Island became a playground for off-the-road vehicles, which further destroyed the dunes, making the landward areas vulnerable to the periodic attacks of storm waves. One undeveloped area virtually destroyed by off-the-road vehicles is the county park along the eastern reach of Fire Island. Here, uncontrolled off-the-road vehicles destroyed two dune lines in a matter of years. Today, this section of Fire Island, "protected" as public land by Suffolk County, lies virtually at sea level and will surely breach in the near future.

Ironically, when the Ocean Parkway was opposed in the 1960s, the opposition was based upon the fears of environmentalists who contended that a parkway would open roadless Fire Island to uncontrolled development and destroy the barrier beach. The environmentalists failed to see that development was already rampant. And worse, they failed to assess the impact of the already present off-the-road vehicles and made no attempt to regulate them, a measure that would have provided more protection than the prevention of a limited access parkway. Moreover, with classic tunnel vision, they did not look westward across Fire Island Inlet to see the high dunes, wide beach, and verdant bayside salt marshes of Jones Beach, which had its segment of the limited-access Ocean Parkway. Had they fully evaluated the proposed parkway extension, they would have concluded that Ocean Parkway protects barrier beaches while it simultaneously provides access to recreation areas.

These environmentalists instead joined forces with those opposing Moses's Rye-Oyster Bay Bridge to the north and stoked then governor Nelson Rockefeller's environmental fervor with the contention that both the Rye-Oyster Bay Bridge and the Ocean Parkway were environmentally unacceptable. Political expediency dictated that Rockefeller demand Moses's resignation as Chairman of the New York State Parks Council. Moses complied and angrily resigned as president of the Long Island State Park Commission as well.¹⁴

Since Moses was the driving force in the extension of the Ocean Parkway, his resignation effectively sealed its fate. Moreover, without a parkway to limit access, the environmental degradation of the eastern barrier beaches was assured.

And so environmentalists won a pyrrhic victory. By keeping Fire Island roadless but not controlling access, the entire barrier beach, with the exception of the relatively small Fire Island National Seashore, has

continued to develop. Moreover, by preventing the construction of the Ocean Parkway on Fire Island, any hope of preserving Westhampton Beach through parkway construction was lost since the parkway along Fire Island was a prerequisite for its extension onto and along Westhampton Beach.

Today, large sections of Westhampton Beach have been destroyed. As on Fire Island, homes have been constructed on and behind the dunes. Much of the bayside salt marsh has been filled in to provide more land for building. The mismanagement of Shinnecock Inlet to the east has deprived the beach of a ready sediment supply, and the beach face began to recede at the same time that building destroyed the dune system.

Even moderate erosion became obvious, alarming those whose homes were built on a disappearing dune. When storms struck the barrier beach in the 1960s, several homes and a large section of the roadway washed away. The residents demanded groins, a cry was taken up by the local decision-makers. This concern resulted in the construction of a mid-beach groin field. A mid-beach groin field is contrary to every precept of barrier beach management, unfortunately. As could be predicted, it merely displaced the erosion to the west. A newly elected group of decision-makers concluded that these groins had failed to control erosion and were thus ineffective. Since that time the "do nothing" alternative has been followed at Westhampton Beach.^{15,16}

During the winter of 1986-1987, the beach breached to the west of the last groin. Homes were lost, and the roadway once again washed away. The road has not yet been repaired, and, as a result, Suffolk County residents have been denied access to one of their few ocean-front county parks. Moreover, residents living along and to the west of the washed-out area have been denied meaningful police and fire protection and ready access to their homes. It is merely a

matter of time before an inlet will form in the eroded area to the west of the last groin. Such an inlet will not be short-lived. Since the groins are preventing the normal movement of sediment along this beach, the inlet will persist, migrate, and threaten additional property.¹⁷

Today we need not debate the merits of a limited-access parkway. All that is necessary is to consider the Ocean Parkway along Jones Beach and compare its wide beach, high dunes, and salt marshes to the degraded environment prevalent along Fire Island and Westhampton Beach. One cannot escape the conclusion that the Ocean Parkway has provided meaningful protection to Jones Beach while assuring access by millions of people to recreation areas.

EPILOGUE

The future of Long Island's parkways in general and the Ocean Parkway in particular is not bright. The postwar building boom has continued and is now spreading onto the north and south forks of eastern Long Island. The city lures white-collar workers from the island, and the island's industrial parks lure blue-collar workers from the city. As a result, Long Island's morning and evening rush hours have clogged roadways in both directions.

The Long Island Expressway has proven to be inadequate as soon as each section was completed. Commuter traffic spilled over onto the Southern and Northern State Parkways, and these roads, never intended to be commuter roads, became rush-hour parking lots. Eventually, the Ocean Parkway was discovered and began to be used by more and more commuters.

In a futile attempt to cope with Long Island's traffic problems, both Southern and Northern State Parkways are being converted to high-speed expressways. Presently, plans are afoot to add four lanes to sections of the Northern State Parkway. Moses's lavishly

planted and landscaped right-of-way is the key for this conversion because, ironically, it provides the State Department of Transportation with a ready supply of state-owned land upon which to construct the additional lanes. Undoubtedly, Downs's "Law of Peak Hour Expressway Congestion"¹⁸ will assure that these arteries will become clogged as soon as they are opened to traffic.

And what of Ocean Parkway? Suffolk

County's mismanagement of Fire Island Inlet has led to the erosion of sections of Jones Beach. This erosion has become so severe that an approximately two-mile section of the Ocean Parkway has been undermined and closed to traffic. If county inertia continues, and past events indicate that it will, perhaps Moses's parkway-by-the-sea will wash away before it too suffers the indignity of becoming an expressway.

NOTES

1. Moses, 1970, p. 113.
2. Black, in Amer. Soc. Civile Engineers, 1987, pp. 3209-3220.
3. Moses, 1931.
4. Caro, 1974, p. 162.
5. Black, in Krieg, 1989, pp. 141-150.
6. Mallamo, In Krieg, pp. 159-168.
7. Caro, pp. 234-236.
8. Shapiro, 1936, pp. 746-750.
9. Black, in Krieg, 1988, pp. 97-105.
10. Caro, pp. 308-314.
11. *Ibid.*, p. 170.
12. Black and Kassner, 1983, pp. 3-5.
13. Moses, 1931.
14. Black, 1985, pp. 110-114.
15. Black, 1987, pp. 47-49.
16. Black, in Stauble, 1989, pp. 159-170.
17. *Ibid.*, pp. 159-170.
18. Downs, 1976, pp. 185-199.

BIBLIOGRAPHY

- American Society of Civil Engineers. *The Fifth Symposium on Coastal and Ocean Management*. N.Y., 1987.
- Black, J. A. and J. Kassner. "Cupsogue: The Place of Breaking Through of Inlets," *Long Island Forum*. Vol. 45, 1, 1983.
- Black, J. A. "Robert Moses and the Eastern Barrier Beaches," *Long Island Forum*. Vol. 47, 6, 1985.
- Black, J. A. "From Fort Tilden to Shinnecock Inlet: The Consequences of Roads and Parkways," *Long Island Forum*. Vol. 49, 3, 1987.
- Caro, R. *The Power Broker*. Knopf, N.Y., 1974.
- Downs, A. *Urban Problems and Prospects*. Rand McNally, N.Y., 1976.
- Krieg, J. *Long Island Studies: Evoking a Sense of Place*. Hofstra University, N.Y., 1988.
- Krieg, J. *Robert Moses. Single-Minded Genius*. Hofstra University, N.Y., 1989.
- Moses, R. *Proceedings of the National Shellfish Association*. Chesapeake Biological Laboratory, Md., 1931.
- Moses, R. *Public Works: A Dangerous Trade*. McGraw Hill, N.Y., 1970.
- Shapiro, S. "Long Island State Parks and Parkways," *Civil Engineering*. Vol. 6, 11, 1936.
- Stauble, D. *Barrier Islands: Process and Management*. American Society of Civil Engineers, N.Y., 1989.

Bacterial Bioassay of Pesticides Contaminating Parkways, Greenways, and Riverways from Nonpoint Sources

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INTRODUCTION

The study reported here came about through events that brought together our research on mutation-causing and cancer-causing pesticides and focused on the injury sustained by two Wood County, Ohio, parks and the river that flows through them.

The injury was inflicted by a person intent on draining floodplain land that he had purchased at a low price. He hired a contractor to channelize an extensive length of the Portage River, including the river section flowing through Old Infirmary Park and Adam Phillips Park, as well as parts of the river owned by several farmers. The machinery used was large and efficient; it cut a wide channel in a very short time. The junior author's wife was park manager for both parks, and she became aware of the channelization when the large machinery began widening the channel in the Adam Phillips Park. After an oral exchange with the developer, the park manager phoned the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the Ohio Department of Natural Resources, local law enforcement personnel, and officials of local government.

There was a rapid response by U.S. Fish & Wildlife scientists, who documented the injury to the stream and took samples of the fish populations in a short section of Old Infirmary Park where channelization had not been completed. A Corps of Engineers field officer arrived in a short time and issued a "cease and desist" verbal order, which was followed with a written order to cease and desist channelizing the stream. These actions were taken under the authority vested in the Corps of Engineers by the Clean Water Act. The reactions of the various

authorities are interesting; nevertheless, the result was the channelization of the natural stream in the two parks before the "drainage project" could be halted.

Shortly thereafter the junior author was appointed to the Water Advisory Council for the State of Ohio by the governor. (The appointment came about because of the intent to protect water resources and water purity in the State of Ohio; however, it was not generated as a result of the events described above.) Among the concerns of the Water Advisory Council were the effects of pesticides and changes in streams resulting from water projects. The unauthorized channelization of the Portage River, in the two parks and on private land, offered an experimental situation which could be used to study changes in streams caused by water projects. The controls for these experiments were immediately upstream from the channelized area.

EXPERIMENTAL METHODS

Our problem was to evaluate the effects of moving agriculture to the edge of streams, farming the floodplains, and, subsequently, contaminating the water by pesticides. Pesticide levels are exacerbated when the buffering effect of floodplain vegetation is lost through stream channelizations. Present practice in testing for carcinogenicity or mutagenicity of chemicals is in disarray. The usual assays employ large numbers of mice or rats. The cost is very high and, since the life span of these animals is much less than humans, high dosages are given.

On the one hand those speaking for the pesticide industry (e.g., Barrick, 1989) ask for a larger foundation of facts. From the same group, however, there is criticism of

the cost of testing, criticism of dosages used, and reluctance to retest pesticides that were approved for sale prior to more recent evaluation procedures. The present study was designed to avoid these criticisms and drawbacks and to provide useful information about nonpoint-source toxics that contaminate surface waters. The information will be useful for park managers and for farmers who may use pesticides on a regular basis.

Bacterial bioassay of toxics is an attractive alternative to the usual tests employing small mammals. Billions of bacteria can be grown at the cost of a few dollars. The assay species can be kept absolutely pure and genetically similar, which together enhance the statistical accuracy of the results. Bacterial growth is so rapid that many replicates can be completed in a short time. Recent evidence indicates that cancer cells differ from their normal counterparts by changes in their DNA. In effect, the cells are programmed to grow in uncontrolled fashion. The definition of a mutation is an alteration of the DNA in living cells. Therefore, tests for carcinogenesis or mutagenesis can shortcut the expensive and lengthy mammal experiments and focus on the question of DNA injury.

We noted that an accurate and sensitive reaction to toxics was developed by Quillardet (1982) which achieved a response to DNA damage of *Escherichia coli*. This was the SOS reaction, with an operon fusion by plasmid transfer into the bacterial cells. It associates the betagalactosidase gene with cellular reactions to injury. When there is bacterial DNA damage, a rapid biosynthesis of the enzyme betagalactosidase results. Its concentration can be determined by adding the enzyme substrate. This addition results in the production of nitrophenol, a yellow compound that can easily be measured colorimetrically.

Xu and Schurr (1990) introduced microtitration techniques with 96 well microplates, automatic photometric record-

ing, and computerized statistical analysis of the results. These modifications transformed the awkward and tedious lab method into an accurate and efficient bioassay.

RESULTS

The assay was applied to 22 commercially available pesticides commonly used in agriculture, horticulture, ground-keeping of

Table 1. Genotoxicity of 22 Pesticides Assayed by Microtitration SOS Chromotest

NAME	RESULTS*	
Acephate	-	0.0
Alchlor	+	0.047
Altrazine	-	0.0
Bentazon	-	0.0
Cacodylic acid	+	0.035
Captafol	+++	106.0
Captan	+++	18.10
Carbaryl	-	0.0
Chlorpyrifos	-	0.0
Cyanazine	-	0.0
Dicamba	-	0.0
Dimethoate	-	0.0
Dinoseb	+++	0.72
Ditalimphos	-	0.0
Ferbam	+++	0.38
Folpet	+++	6.71
Linuron	++	0.12
Metribuzine	-	0.0
Monocrotophos	-	0.0
Nitrofen	-	0.0
Phosmet	+	0.045
Trichlorfon	-	0.0

*Potency of DNA injury/nmole

Interpretation:

- = negative
- +
- ++ = strong positive
- +++ = very strong positive

See Xu, Dutka, and Schurr, 1989 for experimental methods; see Xu and Schurr, 1990 for bioassay protocol.

golf courses, and botanical management of parks. Table 1 shows the relative genotoxicity of these various chemicals. (Genotoxicity is the capability to injure the DNA of cells.) Nine of the 22 pesticides were found to cause DNA injury.

DISCUSSION

Perhaps the best known test to detect DNA-damaging agents is the Ames test, also called the Salmonella/microsome assay (Ames, *et al.*, 1975). However, perfect agreement between our test and the Ames test is not possible because of the different mechanisms of the two tests. The Ames test measures DNA base shifts or substitutions, while our SOS Microtitration Chromotest detects DNA cross-link deletions and insertions. Although there have been complaints about false positive results with the Ames test, we consider it valuable to build the foundation of facts about environmental chemicals.

A recent discovery by Nemali, *et al.* (1989), revealed that toxic chemicals will generate carcinogenic and mutagenic effects in rats by way of mechanism that causes the cells to produce peroxisomes at up to 40 times normal levels. At the same time, H_2O_2 -degrading enzymes remain at a low level, leaving the free radicals in cells to express their mutagenic effects. Since Nemali's test can be completed in two weeks, the Ames test can be finished in a shorter time, and our Microtitration SOS Chromotest can be completed in about one day, we suggest that all three should be used to determine the danger of toxic environmental chemicals. It is time to replace the old-fashioned methodology presently used to test for cancer-causing and mutation-causing chemicals. An efficient base line for estimation of genotoxicity of pesticides and environmental pollutants can be provided by the Microtitration SOS Chromotest alone. We think that this test will allow extremely rapid

screening to identify the most dangerous toxics found in our environment. A toxic chemical giving a positive response could then be assayed by the Ames test and the rat peroxisome bioassay. We have no objection to testing even further by old-fashioned small-mammal bioassay, but we think this would be redundant.

The time has come for a renaissance in bioassay methods for testing toxics. We cannot wait for extended data acquisition, where years may pass by prior to a decision about the safety of a particular pesticide.

A WARNING TO PARK MANAGERS

Baker (1985, 1987) has documented contamination of streams in the Lake Erie drainage by various pesticides. Ohio is not unique in the variety and extent of nonpoint-source pollution of streams; pesticides will be found contaminating parkways, waterways, and streams in most of the United States.

In their efforts to enhance green belts, park managers often resort to applications of herbicides, fungicides, and insecticides. We suggest that this is unwise. Enjoyment of parkways and streams should include multiple uses: fishing, swimming, boating, and birding. If parks apply pesticides, multi-use is impossible. Fish populations decline or are extirpated. Bird populations are reduced, and successful nesting may be eliminated for some species. Swimming or boating should be prohibited where carcinogens and mutagens are found contaminating the water.

We suggest that all pesticides be labeled if they are genotoxic: "This chemical has been found to injure DNA in a bioassay using live cells; therefore it should be considered capable of causing cancers or mutations in humans." If such labeling were required, we think park managers and farmers would better be able to switch to the less dangerous pesticides which are available.

BIBLIOGRAPHY

- Ames, B. N., J. McCann, and E. Yamasaki. "Methods for detecting carcinogens and mutagens with the Salmonella/mammalian microsome mutagenicity test." *Mutation Research*, 1975, 31:347-364.
- Baker, D. "Regional water quality impacts of intensive row-crop agriculture: a Lake Erie Basin case study." *Journal of Soil and Water Conservation*, 1985, 40:125-132.
- Baker, D. "Lake Erie agro-ecosystem program: sediment, nutrient and pesticide export studies." U.S. EPA Great Lakes Program Office, 1987, RO 05727 and RO 05817:1-110.
- Barrick, S. "Pesticide policy: building a foundation of facts." Dow Chemical Newsletter, *The Bottom Line*, 1989, 3:2-3.
- Nemali, R. M., M. K. Reddy, N. Usuda, P. G. Reddy, L. D. Comeau, S. M. Rao, and J. K. Reddy. "Differential induction and regulation of peroxisomal enzymes: predictive value of peroxisome proliferation in identifying certain carcinogens." *Toxicology and Applied Pharmacology*, 1989, 97:72-87.
- Quillardet, P., O. Huisman, R. D'Ari, and M. Hofnung. "SOS chromotest, a directory assay of induction of an SOS function in *Escherichia coli* K-12 to measure genotoxicity." Proceedings National Academy of Sciences, USA, 1982, 79:5971-5975.
- Xu, H., B. Dutka, and K. Schurr. "Microtitration SOS Chromotest: A new approach in genotoxicity testing." *International Journal of Toxicity Assessment*, 1989, 4:105-114.
- Xu, H., and K. Schurr. "Genotoxicity of 22 pesticides by microtitration chromotest." *International Journal of Toxicity Assessment*. In press (1990).

Designing with the Whole Life Community in Mind

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The solely human-centered approach to design, in which the environment acts as inanimate backdrop to human activity, is no longer possible. It has resulted in the disruption of the wider life community of the planet and has begun threatening our entire biological life-support system.

We are finally beginning to realize that we are *part* of the natural world, not *apart* from it. Advances in sciences are teaching us that we are literally in the planet, not on it, and that our human activities are intimately interwoven with the water cycle, the air cycle, the carbon cycle. We are beginning to realize that the ways we form our settlements, our transportation routes, our commerce, and other human functions not only affect

human culture, but the whole ecological community of which we are a part.

At present, our contemporary capacity for acceleration and exponential growth has brought the question of human impact on the natural world out of the realm of "a nice thing to consider" in design and placed it squarely in front of us, as a question of survival. Yet, our ability to re-constellate our human systems in response to direct feedback falls short of what is required.

One consideration in understanding this dilemma is to realize that we as culture may not be fully registering the feedback we are receiving about the devastation of the planet. The information coming in may actually be outpacing our comprehension of it. It may

also be that our perimeters of reality have become so limited that we are not fully “hearing” the natural world speak to us about this crucial information. Our insular urbanization, including concrete pathways, processed nutrition, and televised reality, may be blocking us from this information. We may simply be recording whatever is coming in as “noise” or “static” and may not, in fact, be fully noticing the drastic diminishment in quality of life.

What now? Those of us who are catching glimmers of the vibrant, functioning life community that surrounds us and co-exists with us need to revive our capacities to see, hear, taste, and feel beyond the “broadcasted” boundaries of the contemporary world. We need to discern what is superficial to our life-support system and what is elemental. We need to begin insisting on design models that describe to us the full reality of our situation—both human as well as ecological.

In our modeling we need to acknowledge natural boundaries, not just human-made boundaries, and to take into full account ecological systems such as watersheds, wind patterns, geological formations, etc. Our models need to integrate ecological principles such as entropy, renewal, biological exchange, carrying capacity, and appropriate scale. We need to be factoring in *real* costs of projects, not just the set “prices.” Real costs include environmental considerations, health considerations, as well as cumulative effects and long-term consequences.

A primary aspect of the ecological model is circulation. Human routes need to be designed in the context of other kinds of routes and patterns of circulation. The water cycle, the air currents, even the Earth in its orbit and the moon in its orbit, all circulate and have a bearing on each other. Migration routes of animals; routes of seeds in the wind; pathways of the sand-sharing dune system; animal routes for access to water, food, and for returning to breeding grounds;

routes of bees pollinating flowers—all are aspects of the circulatory pattern of the wider life community. Human routes exist in the context of this symphony of movement.

In this culture we tend to think of the Earth as a noun, but actually a great deal of Earth functions as a verb. And our models need to reflect that. When we design our human systems, we need to be sure that we are not disrupting this flow of life, a flow integral to our own life.

Interestingly, with our culture’s overall design promoting excessive mobility, our civilization is becoming verb as well, whether we like it or not. Our access to work, school, social activities, and so forth requires that we “circulate.” The fact is that many of us are coming to dwell in our automobiles as well as in our homes. Poor or nonexistent urban planning, as well as other physical and psychological factors, have created forced mobility and diminished the quality of life not only of humans but also of the rest of the life community.

When conditions reach such proportions as they have now, with the planet and its human and non-human inhabitants in such condition, what is required in our modeling and our problem-solving?

In order to develop comprehensive models, we need to be in touch with what values we want to nurture as a culture. No culture is value-free. Form informs. The forms that we craft to encompass and facilitate our human activities inform and shape us at every turn. Form reflects values, whether we intentionally subscribe to them or not. It is important that we bring into consciousness the values we want to nurture and let them become an integral aspect of our design of human systems.

In describing what is superficial and what is elemental to our life-support system, we need to prioritize in terms of optimal use and encourage policy-making and incentives to support these priorities. We also need to

develop comprehensive indicators for ecological health.

In our modeling, it is essential that we employ more than linear logic. Linear logic gives us solutions such as "add a lane" to deal with population increase and the rise in motor vehicles on the highways. Relying on this kind of logic, we end up with 44 lanes of interstate traffic. Multidimensional logic is required. Such logic encompasses questions of scale, cumulative effects, appropriate use, multilevel interplay of factors, and so forth.

And logic is only one facet of our neurophysiological capacity for perception and problem solving. We have available to us whole ranges of perception and creative interplay for interacting with the life community in which we live. We have the capacity for in-depth perception and imaginative reflection on how our human designs would interact with and affect the whole, spatially-physically, developmentally, and psychically. We have the capacity to kinesthetically perceive rhythms as well as the disruption of rhythms, and we have the imagination to envision restoration.

It is important that we understand and

embrace the importance of accurate perception of the natural world and the power of design in relating to it. Design can serve to obfuscate or reveal the natural world to us. It can heighten or reduce our capacity to synchronize with other life rhythms besides our own. A culture can actually design for symbiosis, cooperation, integration, and inclusion with the wider ecological community. What is important in design is the reliance on fresh, attentive perception regarding the nature of our multidimensional reality rooted in the natural world.

This is a pivotal time in our planet's history. We have the capacity to witness whole ecological systems at work and to design our human systems to interface comprehensively with these wider processes. It is up to us to renew our inherent capacity to "listen" to the natural world . . . and to act in concert with it. Only when we let its full reality be present to every aspect of our senses are we *capable* of designing for our own well-being in relation to the rest of the life community.

Editor's note: This paper was part of a conference presentation by Thomas Berry and Marnie Muller.

Bacterial Populations Elevated by Stream Modification Projects

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INTRODUCTION

River channelizations extend through many of the natural streams in the United States. As an example, in Wood County, Ohio, all but parts of two streams have been converted into virtual ditches. The focus of this paper is the effect of channelization on bacterial populations and the interaction of bacteria and sediments resulting from these and other stream modification projects.

Channelization removes flood-plain trees, destroys plant cover on the banks, and excavates the natural stream substrate. Water velocity is enhanced, which increases erosion of stream banks and stream beds. In dry weather, a channelized stream will have very low flow due to excessive drainage, which tends to move most precipitation out of the watershed rapidly. In addition, low water levels in the summer and fall prevent dilution of toxic and human wastes.

Soil sediments in water are noted for their electrical charges. The surface electrical activity of clay particulates is described by Clapham (1), who noted that electrical charges depended on the sediment particle type. Channelization sediments are complex media, varying with location and often lacking appropriate description in the literature. Nutrient-rich stream sediments are natural, ideal reservoirs for bacterial growth and reproduction. It has been demonstrated that fecal coliforms and enteric pathogens associate with sediments (see, for example, 2-8). Where human activity has altered natural streams through stream modification projects such as channelization, bacterial populations and their distribution in spoils and sediments deserve close

examination, especially when considering recreational usage of these sites.

SEDIMENT INCREASE AND BACTERIAL POPULATION

The study included Old Infirmary Park, Adam Phillips Park, and sections of the Portage River, locations where there was extensive channelization of the watershed. This area is located in northwestern Ohio and drains parts of five counties. Settling flasks were used to document the increased erosion from a channelization project during the spring high-water flow.

Figure 1 shows that erosion materials and spoils elevated the sediment load up to 54 times more in the channelized section of the river, when compared to the sediment load upstream in an unchannelized area. The channelization had been completed the previous summer.

Bacterial characterization of sediments began with a series of paired comparisons between channelized and unchannelized sections of the Portage River watershed. Plate counts of bacterial numbers were employed using standard methods (9). Tests above and below channelized sections of the river repeatedly revealed bacterial counts two or three times higher in the channelized area. Natural streams, on the other hand, had more stable stream substrates, supported higher populations of micro- and macro-invertebrates, and had lower water temperatures in the summer months due to tree cover. A total of 30 pairs of comparisons were subjected to the sign test (10), where $N=30$, $r=0$, and the two-tailed analysis was employed. At a confidence interval of 99%,

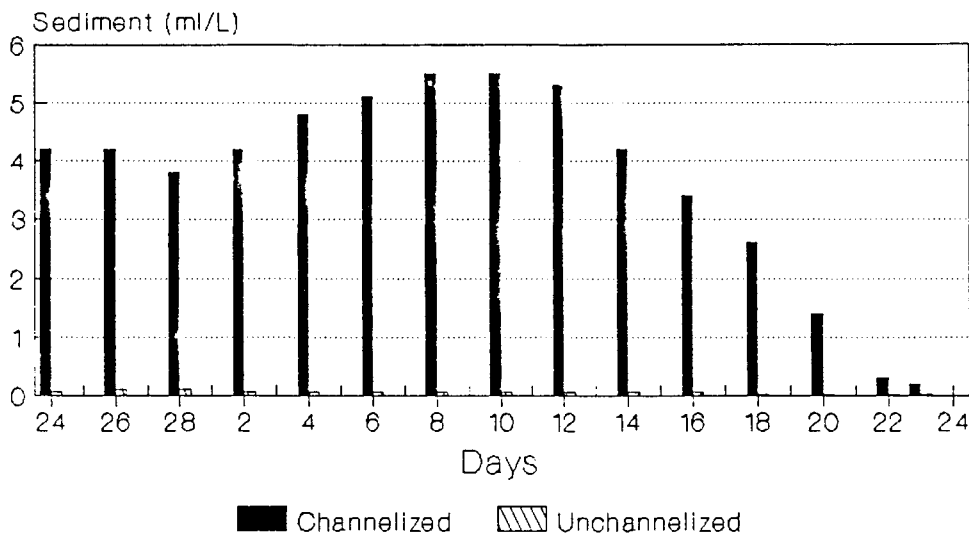


Figure 1. Sediment burden in channelized and unchannelized study areas of the Portage River, Middle Branch, from ice-out until the end of high water.

bacterial numbers were significantly higher in the channelized areas.

Recent research studies by Porter, Sanders, and their associates (11, 12, 13) document consumption of bacteria by protozoans. Other microinvertebrates also remove large numbers of bacteria from natural waters. The importance of consumers of bacteria in aquatic systems has only recently been recognized. Unfortunately, however, we found that species that feed on bacteria are represented by very low populations in channelized streams.

The opportunity for bacterial survival and multiplication will be enhanced by the physical changes resulting from channelization (see 2, 3, 6). Anaerobic sediments, heating of the water, and destruction of bacterial predators all favor the increase of bacteria. In addition, a channelized stream will deposit increased levels of nitrogen compounds in the floodplain as the result of agricultural runoff.

BACTERIAL MOVEMENT WITH SEDIMENT PARTICLES

Our preliminary results, showing that bacterial populations are always associated with sediments, caused us to examine the capability of bacteria to move from stream sediments into the water column. This question becomes vital to public health when spoils and channelization sediments contaminate surface waters. In addition, plasmid-transfer technology is being challenged in the courts, and more evidence about *E. coli* interactions in aquatic sediments is needed in order to make decisions related to the release of genetically engineered bacteria into the environment.

A study area was selected in the Portage River two kilometers east of Rudolph, Ohio. The village of Rudolph lacks sanitary sewers and thus relies on septic tanks. A mobile home park with very poorly maintained septic tank systems was the primary local

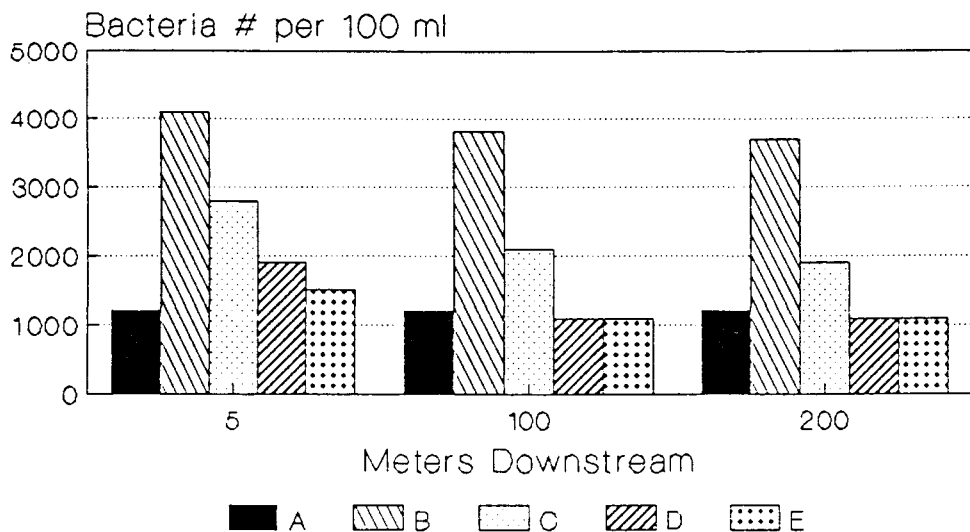


Figure 2. Fecal coliform bacterial numbers from the Portage River. A represents FC in the water column. B represents the number of FC in the water column downstream from where the bottom sediments were hand-roiled. C, D, and E, respectively represent FC present in the water one hour, two hours, and three hours after roiling the sediments.

source of raw sewage. The effluent was dumped directly into a drainage ditch which feeds into the river at the study site.

Subsurface water at a depth of 45 centimeters was sampled, using sterile containers. The first sampling site was supplemented with sample locations at 100 meters and 200 meters downstream. Five meters above the original site, the stream bed sediments were rolled by raking approximately 4 centimeters of the uppermost sediments. After roiling the sediments, subsurface water samples were taken at the original site and downstream 100 meters and 200 meters. Water samples were taken from all three locations at one-, two-, and three-hour intervals. All samples were packed in ice and immediately brought to the laboratory for enumeration and identification procedures. This sampling schedule was continued weekly for the ten weeks following October 21, 1985.

Total (TC) and fecal (FC) coliform

counts were determined using accepted standard procedures (9). Each water sample was tested by membrane filter (MF) for total coliforms (TC) and fecal coliforms (FC) by filtering appropriate decimal volumes (TC—0.01, 0.1, and 1.0 ml; FC—1.0, 10.0, and 20.0 ml) through type HC membrane filters (047S1, Millipore Corporation, Bedford, Massachusetts). The TC were detected with M Endo agar, while the FC were detected with MFC agar (both agars from Difco Laboratories). The TC M Endo agar plates were immediately incubated at 35°C, and MFC agar plates were immediately incubated at 44.5°C. All samples were subjected to the API 20E system (from API Analylab Products) for identification of enterobacteria and other gram-negative bacteria.

Figure 2 illustrates a characteristic profile of fecal coliform bacteria during one weekly sampling schedule. Roiling the sediments increased the FC count more than

three-fold, 5 meters downstream of the raked area. Almost the same FC bacterial numbers were documented 100 meters and 200 meters downstream an hour later. The FC counts tended to subside three hours after roiling due to sediment settling and downstream transport by the water current. Total coliform bacterial counts revealed the same relative proportions as FC, but they were more than 20 times greater in actual numbers. Typical increases in TC numbers after roiling sediments, are represented by the following samples: 32,000/100 ml before versus 202,000/100 ml afterwards.

The roiling of sediments thus brought spectacular increases in both FC and TC bacterial numbers into the water column. Precipitation caused similar increases. When a heavy rain caused muddy water, both FC and TC bacterial numbers were greatly increased. As might be expected, rain-induced turbulence raised sediments from the bottom for the entire length of the channelized section of the river. There was, therefore, no difference among the three sample sites and little reduction of bacterial numbers over time until the high water subsided. Natural rainfall, and the stream turbulence it causes, flushes bacteria from sediments into the water column.

It becomes obvious that stream sediments from channelization are a public health threat because of the increased bacterial populations associated with these sediments. Either human activity roiling the sediments or natural rainfall can stir up bacterial populations.

DISCUSSION

Erosion sediments are composites of particulates and become fluid or semi-fluid substrates in surface waters. Since they have electrical charges, this sediment substrate can be compared to mixtures of several ion-exchange resins. Characterization of bacteria

in sediments and spoils will require an analysis of bacterial numbers, counts of bacterial cell type (as shown by EM micrographs), and the documentation of particulate chemistry in the sediments by x-ray diffraction.

We postulate the existence of complex interactions in sediments found in water. It is reasonably certain that heavy metals bind to sediments through interactions that include the electrical charges on the sediment particles (14, 15). Organic compounds probably attach to sediments in the same way; adsorbance and absorbance are perhaps due to weak electrical charges that form binding sites with organic chemicals. There is evidence that virus particles interact with sediments similarly (16). We suggest that sediments in water react much like redox potentials in oxidation-reduction reactions. A certain sediment particle will have a specific electrical charge. Bacteria, viruses, heavy metals, and organic compounds will attach to the sediment particle. There may be competitive binding among the bacteria, viruses, and chemical pollutants, represented by both weak and strong binding properties, thus accounting for varying degrees of adhesive attachment to sediment particles. Perhaps these attachments vary with temperature, availability of oxygen, and pH of the water. This hypothesis offers useful constructs for future research. Without question, however, is the attachment of bacteria to individual sediment particles. The transport of the attached bacteria to new sites depends on the velocity of the stream at any given time and location.

Our experiments in the field and our laboratory tests show that sediments from stream channelization can have significant implications for public health. Because erosion and sedimentation are increased by channelization, the environmental effects of sedimentation should be a factor in each decision regarding a 404 permit for a specific

project. The results of our work support the decision of Judge N. Walinski of the U.S. District Court for the Northern District of Ohio (*Reid, et al. versus Marsh, et al.*; C 81-690; January 4, 1984). Judge Walinski linked approval of a 404 permit with a requirement for evaluation of the sedimentation and erosion from the proposed channelization.

Related parameters to study in addition to bacterial populations in sediments include virus number, heavy metals, and organics likely to be in the sediments. Water quality, fish and game populations, downstream flooding and low flow levels in summer months are also factors vital to the enjoyment of water resources in our society.

If the public interest is not served by a proposed project, our research and that of others now documents specific effects from channelization which can enable responsible officials to refuse a 404 permit. Among the effects to be evaluated are sedimentation,

and their associated bacterial populations. From the standpoint of public health, human welfare, and water quality, major stream modifications such as channelization and reconstruction projects should be avoided in parkways, greenways, riverways, and watercourses which are designed to support beautification programs and recreational usage.

ACKNOWLEDGMENTS

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REFERENCES

1. Clapham, W. B., *Natural Ecosystems*. Collier Pub. Co., London, 1983, p. 230.
2. Hendricks, C. W., "Increased recovery rate of salmonellae from stream bottom sediments versus surface waters," *Applied Microbiol.*, Vol. 21, 1971, pp. 379-380.
3. Coleman, R. N., J. N. Campbell, F. D. Cook, and D. W. S. Westlake, "Urbanization and the microbial content of the North Saskatchewan River," *Appl. Microbiol.*, Vol. 27, 1974, pp. 93-101.
4. Babinchak, J. A., J. J. Graikoski, S. Dudley, and M. F. Nitrowski, "Effect of dredge spoil deposition on fecal coliform counts in sediments at a disposal site," *Appl. Environ. Microbiol.*, Vol. 34, 1977, pp. 38-41.
5. Matson, E. A., S. G. Hornor, J. D. Buck, "Pollution indicators and other microorganisms in river sediment," *Journal of Water Pollut. Control Fed.*, Vol. 50, 1978, pp. 13-20.
6. Grimes, D. J., "Bacteriological water quality effects on hydraulically dredging contaminated Upper Mississippi River bottom sediment," *Appl. Environ. Microbiol.*, Vol. 39, 1980, pp. 782-789.
7. Laliberte, P. and D. J. Grimes, "Survival of *Escherichia coli* lake bottom sediment," *Appl. Environ. Microbiol.*, Vol. 43, 1982, pp. 623-628.
8. Schillinger, J. E. and J. J. Gannon, "Bacterial adsorption and suspended particles in urban stormwater," *Journal of Water Pollut. Control Fed.*, Vol. 57, 1985, pp. 384-389.
9. American Public Health Association, *Standard Methods for the Examination of Water and Wastewater*, 16th Ed. American Public Health Association, Inc., Washington, D.C., 1985.
10. Zar, J. H., *BioStatistical Analysis*, 2nd Ed. Prentice-Hall, Englewood Cliffs, New Jersey, 1984, pp. 386-395.

11. Porter, K. G., E. B. Sherr, B. F. Sherr, M. Place, and R. W. Sanders, "Protozoa in planktonic food webs," *Journal of Protozoology*, Vol. 32, 1985, pp. 409-415.
12. Porter, K. G., R. J. McDonough, and R. W. Sanders, "Particle feeding by freshwater algae," *American Soc. of Limnology and Oceanography*, 1986.
13. Sanders, R. W., K. G. Porter, and R. J. McDonough, "Bacterivory by ciliates, microflagellates and mixotrophic algae," *American Soc. of Limnology and Oceanography*, EOS 66: 1314, 1986.
14. Lafroth, G., *Methylmercury—A Review of Health Hazards and Side Effects Associated with the Emission of Mercury Compounds Into Natural Systems*, Ecological Research Committee, Bull. #4, Working Group on Environmental Toxicology, Swedish Natural Science Research Council, Sveavagen S-113 46, Sweden, 1969.
15. Walters, L. J., T. Kovacik, and C. Herdendorf, "Mercury occurrence in sediment cores from western Lake Erie," *Ohio Journal of Science*, Vol. 74, 1974, pp. 1-19.
16. Fuhs, W. G., M. Chen, L. S. Sturman, and R. S. Moore, "Virus adsorption to mineral surfaces is reduced by microbial overgrowth and organic coatings," *Microb. Ecol.*, Vol. 11, 1985, pp. 25-39.

Multiojective Management of River Corridors: A Floodplain Management Perspective

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Our nation's 3.5 million miles of rivers and streams and the lands adjacent to them are some of our most important assets. Making up about 7 percent of our total area, they provide a variety of valuable resources and contain substantial capital investments in structures for those who live, work, or engage in business as well as infrastructure for transportation and commerce. It is estimated that nearly 20 percent of land in our urban areas is subject to flooding and that about half of this flood-prone land is developed.

THE GENESIS OF A PROBLEM

The early European settlement of this nation occurred along its watercourses for transportation, water supply, water power, waste disposal, commerce, and other purposes. This settlement pattern followed that of earlier native Americans who established their towns and villages along rivers for

many of the same reasons. As a result, many of our earliest archaeological sites are along river corridors. Established development patterns caused growth of early settlements to occur along these river corridors, resulting in a continual pattern of occupancy and use. This problem continues even today as unwise decisions are made regarding the expanded economic use of river corridors.

These rivers and streams periodically flood when the water runoff from the contributing land areas exceeds the carrying capacity of the conveyance channel. These floods vary in the quantity of water to be accommodated and the amount of adjacent land inundated to temporarily convey and/or store the excess water.

During the early development and growth of our nation, floods were not of major national economic consequence because of limited floodplain occupancy and resultant damage, inadequate data-

gathering and synthesis techniques, and rudimentary communication techniques. Floods and their solutions were considered an individual or local problem. Continued development along rivers and streams resulted in concurrent increases in flood damages. Along major rivers some flood events described as “rare” resulted in millions of acres of inundated land, and even more frequently occurring floods of substantial size along smaller rivers or streams, including heavily occupied and invested areas. By the early part of this century, the extent of development and resultant flood damages had increased to the point that federal responses to increasing flood losses were demanded.

THE FEDERAL RESPONSE

The initial federal response was through construction of flood-protective works, i.e., floodwater detention reservoirs, earthen levees, concrete floodwalls, enlarged existing channels, flood bypass channels, and other measures to modify the extent and/or direction of floodwaters to keep them away from occupied and invested areas. The basis for much of this early activity resulted from the Flood Control Act of 1936.

Federal investment in flood-protective projects was accompanied by an increase in the rate of economic use of our floodplains as part of overall national growth after World War II. These projects did not keep pace with the rate of floodplain use. Despite federal investments approaching \$10 billion by the early 1960s, average annual flood losses increased.

More comprehensive approaches to resolving the economic losses and threats to public safety resulting from floods were sought. Floods, which had always occurred naturally, were now causing a national dilemma because of the extent of development within flood-prone areas. In many

locations the frequency and magnitude of floods were also increasing because land-use changes resulted in substantial increases in water runoff from paved and other impervious areas.

One response was enactment by Congress of the National Flood Insurance Act of 1968. Through this program, first administered by the Department of Housing and Urban Development (HUD) and now administered by the Federal Emergency Management Agency (FEMA), flood insurance is available to individuals in participating communities as a substitute for post-flood disaster assistance and other forms of federal aid. As a result, those who already occupy or use the floodplain can obtain federally subsidized flood insurance to deal with potential economic loss from future floods. Those who wish to use the floodplain after community enrollment in the National Flood Insurance Program (NFIP) must adjust that use to the flood risk involved.

REDUCING ECONOMIC LOSSES

Over 17,000 flood-prone communities are currently participating in the NFIP. In return for the availability of flood insurance, they are required to enact and enforce floodplain regulations that, at a minimum, meet the floodplain management criteria developed by HUD and FEMA to implement the land-use component of the flood insurance program. Most participating communities have enacted the minimum federal criteria.

These criteria require designation through a local ordinance of a floodway along the river or stream to allow for safe passage of floodwaters. Future development within the floodway is restricted to those uses that will not cause further obstruction of floodwaters. Although additional development is not prohibited, it is severely restricted. Floodways are also associated with large depths of floodwaters flowing at

swift velocities and are considered impractical and unsafe for permanent human occupancy and use. Through the NFIP requirements, communities have designated over 9,000 square miles, or nearly 6 million acres, of river corridors as floodways. These floodways contain many natural resources and most of our riverine wetlands.

Development permitted by local ordinances in the remainder of the regulated floodplain (established by engineering studies to include that area that would be inundated by a flood that has a one-percent annual chance of occurrence) must be protected by siting and construction practices to prevent damage upon the occurrence of this and more frequent flood events. As a result of flood insurance program requirements, a total of about 160,000 square miles, or over a hundred million acres, of the nation's floodplains are regulated by local ordinances. The commitment to and effectiveness of these local floodplain regulations vary considerably.

Consequently, most floodplain management measures being carried out today at the local level are responses to the requirements of the NFIP. Requirements to adopt these measures stem from mounting flood losses resulting from unwise occupancy and use of our nation's floodplains. Thus, most floodplain management measures have as their primary purpose flood-loss reduction. Floodplain management policies, programs, and practices to implement this objective are developed and carried out largely by those with an engineering or planning background.

Floodplain management strategies for flood-loss reduction may be grouped into those designed to modify flooding (the early approaches to flood problems), those that modify the impact of flooding, and those that reduce the susceptibility to flood damage (see Table 1). Each strategy has a variety of tools for implementation. Although widely

viewed as floodplain management, most measures implemented at the local level involve only floodplain regulations and eligibility for individuals to purchase flood insurance. In addition, some localities have flood modification projects, often designed and built with substantial federal assistance. Although there are a few notable exceptions, most communities have not implemented other listed measures shown on Table 1.

EXPANDING FLOODPLAIN MANAGEMENT OBJECTIVES

Among floodplain managers at all levels (federal, state, local) there has emerged over the past two decades a slow but growing awareness and interest in maintaining the resource values contained within our river and stream corridors. Existing management measures, primarily designation and controls within the floodway for flood-damage reduction and public safety, provide some resource protection. Most of these measures are, however, limited and are tied to the flood-loss objective.

The coalescence of interest and present programs and policies regarding the maintenance of river corridor values may have its genesis in the National Environment Policy Act of 1969. In enacting this measure, Congress formally recognized that the values of environmental resources depend upon the function of complex natural systems. This act declared environmental quality to be a national goal and established a procedure for environmental impact assessment for proposed federal projects and programs that may significantly affect the environment. Federal agencies were required by the act to develop implementing procedures, and most have assigned supporting staff for this purpose. Thus, the legislative and administrative foundation was formally set in place for an evaluation of the environmental values associated with river corridors.

Table 1. Strategies and Tools for Flood-Loss Reduction

Strategy A. Modify Susceptibility to Flood Damage and Disruption

1. Floodplain Regulations
 - a. State Regulations for Flood Hazard Areas
 - b. Local Regulations for Flood Hazard Areas
 - 1) Zoning
 - 2) Subdivision Regulations
 - 3) Building Codes
 - 4) Housing Codes
 - 5) Sanitary and Well Codes
 - 6) Other Regulatory Tools
2. Development and Redevelopment Policies
 - a. Design and Location of Services and Utilities
 - b. Land Rights, Acquisition and Open Space Use
 - c. Redevelopment
 - d. Permanent Evacuation
3. Disaster Preparedness
4. Disaster Assistance
5. Floodproofing
6. Flood Forecasting and Warning Systems and Emergency Plans

Strategy B. Modify Flooding

1. Dams and Reservoirs
2. Dikes, Levees, and Floodwalls
3. Channel Alterations
4. High-Flow Diversions
5. Land Treatment Measures
6. On-site Detention Measures

Strategy C. Modify the Impact of Flooding on Individuals and the Community

1. Information and Education
2. Flood Insurance
3. Tax Adjustments
4. Flood Emergency Measures
5. Post-Flood Recovery

An earlier legislative act had provided a basis for affirming that interest and for work that resulted in its enhancement within the floodplain-management sphere of interest and influence. The National Flood Insurance Act of 1968 directed the development of proposals to be considered by Congress for a unified national program for floodplain management. A document was prepared by the Federal Interagency Floodplain Management Task Force, first issued in 1976 and subsequently revised and updated in 1979 and 1986.

The report sets forth two broad objectives—to reduce loss of life and property and to reduce losses of natural and beneficial values from unwise land use—in seeking wise use and management of the nation's floodplains. A conceptual framework provides general guidance for the decision-making processes of federal, state, and local officials as well as for private parties. Strategies and tools for flood-loss mitigation and for the preservation and restoration of natural floodplain values are presented in detail. The report groups these values into three broad categories: water resources values, living resources values, and cultural resources values (see Table 2). Strategies for managing floodplains involve those to restore lost or diminished values as well as those to preserve the wide diversity of values in relatively undisturbed floodplains. Finally, actions are recommended to facilitate coordination of management programs dispersed among all levels of government.

Emphasis on protecting and enhancing environmental quality is embodied in other important legislation enacted over the past two decades, including the Wild and Scenic Rivers Act of 1968, the Endangered Species Act of 1973, the Clean Water Acts of 1972 and 1977, and the Water Quality Act of 1987. Arguable the most important of these to preserve the natural and beneficial values within the riverine corridors are the clean

water acts. Section 404 of the Clean Water Act of 1972 supplemented the U.S. Army Corps of Engineers existing permitting program regarding activities in navigable waters (pursuant to Section 10 of the Rivers and Harbors Act of 1899) by requiring permits for the discharge of dredged or fill materials into all waters of the United States. The U.S. Environmental Protection Agency (EPA) was assigned the responsibility for developing guidelines to assist in the implementation of Section 404. Section 404 also authorized EPA to prohibit or restrict discharges with unacceptable adverse impacts on fish, shellfish, wildlife, water supply, or recreation. The Water Quality Act of 1987 made sweeping revisions in EPA's approach to storm water discharge permitting. The EPA was directed to prepare regulations and to implement a permit system for separate storm water sewer systems. Water quality monitoring and mitigation programs will be new responsibilities for the river corridor manager.

Implementation of this and other legislations helped set the stage for the 1977 Executive Orders on Floodplain Management (11988) and Protection of Wetlands (11990), both of which accompanied President Carter's *Message on the Environment* to Congress, in which he stressed the scope of environmental issues and pledged firm support to environmental protection. The Floodplain Management Executive Order established a general policy bringing together concerns for human safety and reducing economic losses with those for restoring and preserving natural and beneficial floodplain values. The policy directives of the order are to 1) avoid direct or indirect support of floodplain development, 2) avoid actions located in or affecting the floodplain unless the floodplain location is the only practicable alternative, and 3) in the absence of a practicable alternative, require that the action be designed or modified in order to

Table 2. Floodplain Natural and Cultural Values**Water Resources Values***Natural Flood and Erosion Control*

- Reduce flood velocities
- Reduce flood peaks
- Reduce wind and wave impacts
- Stabilize soils

Water Quality Maintenance

- Reduce sediment loads
- Filter nutrients and impurities
- Process organic and chemical wastes
- Moderate temperature of water
- Reduce sediment loads

Maintain Groundwater Supply and Balance

- Promote infiltration and aquifer recharge
- Reduce frequency and duration of low flows

Living Resources Values*Support Flora*

- Maintain high biological productivity of floodplain and wetland vegetation
- Maintain productivity of natural forests
- Maintain natural crops

Provide Fish and Wildlife Habitat

- Maintain breeding and feeding grounds
- Create and enhance waterfowl habitat
- Protect habitat for rare and endangered species

Cultural Resources Values*Maintain Harvest of Natural Products*

- Create and enhance agricultural lands
- Provide areas for cultivation of fish and shellfish
- Protect silviculture

Provide Recreational Opportunities

- Provide areas for active and consumptive uses
- Provide areas for passive activities
- Provide open space values
- Provide aesthetic values

Provide Scientific and Outdoor Education Areas

- Provide opportunities for ecological studies
- Protect historical and archeological sites

minimize potential harm to or within the floodplain. The Executive Order for Protection of Wetlands, issued at the same time, is closely related and similar in structure. This relationship has been highlighted in implementation of both orders. As stated earlier, most inland wetlands are located within riverine floodplains, and thus the orders often cover the same areas.

Experience with both orders strongly suggests the need for integrated management of wetlands and floodplains within river corridors. It also points out that floodplain management (and, for that matter, the management of wetlands and other natural resources) should be regarded as a process by which decisions are made rather than simply a set of floodplain regulations, flood insurance, or flood control structures.

With this management framework in place, and lessons and experiences in working with limited objectives and areas, there is a growing interest among floodplain managers and others in broadening the traditional floodplain management objective of flood-loss reduction and protection of lives within a limited floodplain area to include multiple management objectives and approaches. This broadened emphasis involves looking at the entire river corridor and encompasses total watershed management.

INTEREST IN RIVER CORRIDOR MANAGEMENT: EXPLANATIONS AND EXAMPLES

There are several causes or reasons for this growing, but not yet widespread, interest. Over the past few decades better procedures have been developed to identify and document the natural and beneficial resources and values contained within river corridors. Environmental impact analysis, for example, details the extent of benefits these resources

provide as well as how they can be impacted, impaired, or even lost. The federal acts and executive orders, described above, have helped to give formal recognition to the environmental aspects of floodplain management and the broader river corridor and to establish a conceptual and management framework.

There are also increasing (although still limited) levels of interdisciplinary and intergovernmental cooperation. Most riverine wetlands are located within floodplains, and wetlands managers, floodplain managers, and other natural resources managers are discovering that they are involved in the same areas and share interests and needs. But much remains to be done. There is still a significant polarization of positions, missions, and interests.

Some managers have already recognized, and others are discovering that single-objective management approaches are not working well or as effectively as they could or should be working. Most floodplain management objectives and practices use existing watershed and floodplain conditions to determine areas of involvement; generally deal with controlling future development; do little for existing problems; look at only a small portion of the floodplain and river corridor (i.e., the one-percent annual chance flood); and are typically single purpose (i.e., flood-loss reduction).

Community and citizen interest in floodplain management for flood-loss reduction is generally lukewarm at best. Most programs exist because of a state mandate or requirement to participate in the National Flood Insurance Program. Because of the perceived unlikelihood of a regulatory "100-year" flood and the prevailing view that government will bail flood victims out, any support is often tacit. Putting together multipurpose management plans and programs to meet a number of community needs helps broaden the political and public

support needed for success. This new strategy includes being able to put together funding packages where resources and support are not adequate for single-objective approaches.

However, there are several notable examples of communities that are carrying out multiobjective planning and implementation of river corridor management plans for park, parkway, wildlife, conservation, agricultural, or other environmental or social uses. These include Boulder, Colorado; Chattanooga, Tennessee; Minneapolis-St. Paul, Minnesota; Raleigh, North Carolina; Scottsdale, Arizona; and Tulsa, Oklahoma. At the state level, numerous regulatory and nonregulatory programs have been developed that apply directly or indirectly to floodplains, wetlands, shoreline, and natural resource protection. Many of these have paralleled federal efforts in resource management and environmental protection.

At the federal level the U.S. Environmental Protection Agency has, over the past two years, taken the lead role in sponsoring, along with several other members of the Federal Interagency Floodplain Management Task Force, several symposia on the subject of multiobjective management of river corridors. The purpose of these symposia was to heighten awareness and interest in management opportunities and to build broader support at all levels.

The President's Commission on Americans Outdoors, created by President Reagan in 1985 and chaired by Governor Lamar Alexander of Tennessee, took due note of the importance of these stream corridors for outdoor recreation. The commission's report, released in 1987, called for wide-ranging programs to be implemented at the local level that would clean up and protect rivers and wetlands, preserve floodplains, and educate the public about these valuable recreation resources. The report also envisioned a "living network of greenways" that could be established on streams and

other corridors, linking community to community and eventually spanning the nation.

Support is growing at the Congressional level. Earlier this year Congressmen McDade (Pennsylvania) and Udall (Arizona) sponsored a series of fact-finding workshops across the nation to gather information and reach a consensus to define more clearly the goals, attitudes, and alternatives available for coordinating the multiple uses of river corridors, including finding ways for achieving balances between conservation and economic uses.

FLOODPLAIN MANAGEMENT TASK FORCE VIEWS

The Federal Interagency Floodplain Management Task Force and other floodplain management representatives and interests were requested by Congress to share their insights, concerns, and specific ideas for improving multiobjective river corridor management. The task force drew upon information from the EPA symposia and other sources, including its own work in providing a framework and guidance in achieving a unified national program for floodplain management. In its letter to Congress, the task force identified several general guidelines for multiobjective river corridor management derived from the above processes. They are:

1. Let local concerns, not state or federal priorities, generate river corridor projects. A local community or communities should also have a central role in all aspects of the project, from onset through implementation.
2. Bring all viewpoints to the table. Two important benefits are derived: a) the expertise contributed by various interests will help provide solutions, and b) participants will provide broad-based

support in implementing activities identified.

3. Involve the public early and fully, from defining problems and goal setting to implementing solutions.
4. Do not plan to plan, plan to make things happen. In the past, planners planned first and others took action later. Too often, no one took that action. Show progress early; be action-oriented in the short term as well as the long term.
5. Develop a big bag of tools: creative and innovative designs, methods, financing, and institutional arrangements. Single-purpose programs and traditional solutions are not enough. Versatile, creative approaches are needed in all aspects of river corridor management.
6. Recognize that there will be conflicts, and prepare for them. These planning efforts are often initiated because of ongoing conflicts. Head-on confrontation can be divisive, fragment project participants into cliques, and end in stalemates. Creative conflict resolution is needed. Identify win/win solutions wherever possible.
7. Be flexible enough to deal with a variety of geographic situations. Vegetation, geology, soils, topography, and rainfall differ widely, so river corridor projects must be responsive.
8. Base solutions on good science. New and developing areas of scientific expertise include landscape ecology (managing ecologically in the context of the broader physical landscape), geographic information systems, soil bioengineering (using natural vegetation and fibers to stabilize slopes and banks), and wetlands restoration and management.
9. Information is needed on how to do things, not what to do. What to do can and should be determined locally. Better

information on how to do it is where the state and/or federal government can provide assistance.

The task force's letter went on to state that the last point listed was an area of particular interest. All of the agencies represented on the task force provide technical assistance to states and communities. Clearly, based on the comments of participants in the symposia, there is a need to provide states and communities with specific kinds of technical information that they may not be receiving now.

Additional information is needed in a form that will allow integration of many single-purpose programs into one comprehensive framework. One important example is the need for communities to deal with water quantity (flooding) and water quality problems simultaneously. Historically, water quantity has often been dealt with by moving water out of town as quickly as possible. This strategy is not generally compatible with protecting water quality. Technical assistance is needed to identify how to deal with these issues simultaneously. In many cases, integrating conventional flood control approaches with innovative and creative techniques using local topography and natural materials would be the best solution to water resource problems. Both new techniques and integrated approaches should be shared with communities nationally.

Natural areas must be planned into the urban environment to meet a number of objectives, including open space, recreation, flood control, water quality improvement, aesthetics, urban wildlife habitat, and others. Providing information and education on the environment to the public in these settings is extremely important.

A better understanding of costs, both short and long term, is also needed. Cost effectiveness is often cited as the reason for selecting one strategy over another. Communities need assistance in effectively evaluating costs—including installation,

operation, and maintenance—and secondary benefits (such as preventing the need for advanced wastewater treatment) need to be considered. Secondary benefits can be particularly important within the context of multiobjective river corridor management.

It appears that widespread interest in multiobjective river corridor management is fostering new ideas about urban development, land use planning, and even urban aesthetics. Many of these innovative designs will “look” different from what we have come to anticipate in urban settings.

The interest expressed by Congress and the participants in the symposia helped focus the task force’s attention on maintaining and restoring the natural and beneficial uses of floodplains. Reducing flood losses and protecting floodplain values are the two objectives of the task force’s Unified National Program. The task force believes that they can be mutually beneficial. As task force members evaluate the status report on floodplain management, they will direct attention to ensuring that the Unified National Program meets this objective. Based on the fact-finding workshops and comments from numerous sources and interests, legislation pertaining to river corridor management is currently being drafted for introduction in Congress.

SOME SOURCES OF ASSISTANCE

In addition to the previously reported activities and efforts, there are several other important contributions. Several years ago the EPA determined the need to become involved in wetlands protection beyond its regulatory involvement in helping administer the Section 404 permit program mentioned above. An Office of Wetlands Protection was created within EPA in response to the continuing losses and degradation of the nation’s wetlands. The office’s primary mission is to look at the nonregulatory initiatives and ways of protecting wetlands.

This office has sponsored several symposia and other forums including those on multiobjective river corridor management.

Regional offices of EPA, through their wetlands program, can provide technical assistance on how to maintain and/or restore the natural and beneficial values of floodplains. This assistance includes identification of these values, how they will be impacted by proposed development or use, and prevention or mitigation actions and techniques.

In addition, the National Park Service (NPS) with the U.S. Department of the Interior has assisted communities in planning to protect greenway values. This activity has been accomplished primarily through the service’s State and Local Rivers Conservation Assistance Program, which is designed to help governments, private groups, and landowners prepare conservation plans. Technical assistance usually consists of statewide river assessments and river corridor plans. The plan can be initiated by a government agency or a private group such as a land trust or a watershed organization. This approach has been used in over 40 states and 150 river areas and has resulted in the creation of local river protection groups, conservation legislation, voluntary private landowner actions, and more effective use of existing government programs. The NPS reports that this process has proven to be a positive way for landowners and government interests to help shape the future of important river corridors.

In the Tennessee Valley region during the last two years, TVA has been active in encouraging communities to look at designating greenways as devices to preserve floodplains and create recreational opportunities. Agency personnel helped in producing greenway plans for Kingsport and Hixson, Tennessee, and are presently providing assistance on several greenway planning efforts in Tennessee and surrounding states.

LOCAL REGULATORY AND PROTECTION TECHNIQUES

There are several types of regulatory and protection techniques for river corridors currently being applied. These techniques may not be as well documented or understood as those for flood-loss reduction, but they can be effectively integrated or juxtaposed with the more widely applied flood-loss reduction regulatory measures.

A number of communities and counties that have adopted regulations controlling activities in the one-percent-annual-chance flood area have also adopted modest amendments to these existing regulations resulting in a less controversial, more immediate and feasible way of protecting many nontidal wetlands and other natural areas. These minimal amendments substantially increase protection. They may be effectively included in other codes and regulations.

While most subdivision regulations do not specifically regulate wetlands and other natural areas, nearly all contain prohibitions against building in areas in which soil, subsoil, or flood conditions would create public health or safety hazards. Standards for subdivision development can be expanded to cover wetland and natural areas management. Communities without these protection provisions can adopt minor amendments to their subdivision ordinances to help to protect these areas from further filling, dredging, drainage, or development.

Similar strategies can be employed in implementing sanitary codes governing the location and operation of private wastewater systems. Finally, communities that have other special ordinances (such as regulating sand and gravel extraction and tree cutting, and requiring site plan review for major developments), can make minor amendments to the purpose section of such special ordinances to extend their application to wetlands and other special areas.

Communities undertaking a river corridor management program, particularly a protection program, must be willing to make a long-term commitment that includes not only the above regulatory approaches but also other means to achieve the program's objectives. These other techniques may include:

1. Public acquisition through the use of public funds or by encouraging private donation. The acquisition may be full title and interest of the property or an easement. Funding for public acquisition can be derived from a variety of sources—special taxes, fees, general revenue appropriations, income tax “check offs,” and special state and federal programs and funds designated for this purpose.
2. Private acquisition through conservation organizations who then manage or reconvey purchased lands to public resource agencies.
3. Tax incentives whereby the landowner may realize a substantial federal tax benefit by donation of a conservation easement, such as one restricting the donor's right in perpetuity to develop the designated area. Communities can also help protect these areas by ensuring that they are taxed for local real estate purposes at a minimal rate, thereby helping to prevent sale or subdivision due to tax pressures. This action will also reduce the burden of regulation.
4. Public education to help the public better understand the many values provided by our river corridors. This approach has involved printed matter, radio and television programs, educational outings and programs for school children, programs for the business community, and hands-on experiences for the public to “get in touch” with the resource.
5. Actions by citizen advocates that provide

important backup to regulatory and nonregulatory efforts by local governments. Managing and protecting the resource of our river corridors need to involve the participation of individuals, conservation groups, and others in a variety of ways and actions.

SOME STEPS TOWARDS MULTIOBJECTIVE MANAGEMENT

What steps can be taken by floodplain managers, wetlands managers, resource managers, and others to better achieve multipurpose management of river corridors? From this floodplain manager's perspective, several are suggested. First, environment groups, special interests, and community advocates need to understand local floodplain management programs, goals, and administrative procedures and become more involved in influencing the outcome of local decisions affecting floodplain development and use. Local officials and other decision-makers in turn, need to view undeveloped floodplains and other areas in the river corridor as a valuable community asset. To overcome opposition, they will need the help of many others representing various disciplines and interests to document the community

resources and values these areas provide.

Localities need "how to do it" advice and support. Experience reveals that the level of local action is generally proportional to the level of assistance provided to local planners and decision-makers. Localities also need follow-up contacts and continuing assistance because of the rapid turnover of appointed and elected officials and because of the inherently slow process of compiling information and of planning and developing regulations and other management approaches.

In addition, floodplain managers and others need to broaden their program goals to include maintenance of natural and beneficial resources and resource values along with the traditional goal of flood-loss reduction. A working knowledge of resource protection approaches, techniques, and programs is necessary. There needs to be a broader interdisciplinary, intergovernmental view and effort devoted to river corridor management, eliminating polarization of positions, issues, and solutions.

Finally, adding standards to the existing 17,000-plus sets of community floodplain management regulations will rapidly provide a form of protection to wetlands and other sensitive areas.

FURTHER READING

"Questions and Answers on the National Flood Insurance Program," Federal Emergency Management Agency, August 1987.

A Unified National Program for Floodplain Management, Federal Emergency Management Agency. Prepared by the Federal Interagency Task Force on Floodplain Management, March 1986.

Executive Order 11988—Floodplain Management and Executive Order 11990—Protection of Wetlands, issued on May 24, 1977 by President Carter.

A Status Report on the Nation's Floodplain Management Activity, An Interim Report. Prepared by the Federal Interagen-

cy Task Force on Floodplain Management, April 1989.

"America's Wetlands: Our Vital Link Between Land and Water," Office of Wetlands Protection, U.S. Environmental Protection Agency, February 1988.

"Regulations for Floodplains," American Planning Association, Planning Advisory Service Report No. 277, February 1972.

"Protecting Nontidal Wetlands," American Planning Association, Planning Advisory Service Report No. 412/413, Dec. 1988.

"National Park Service Assists Communities in Planning Greenway Values," *National Wetlands Newsletter*, Sept.-Oct. 1988.

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V. Citizen Involvement

Grassroots Protection of River and Trail Corridors: A Discussion From Experience

*Lorah P. Hopkins, Schuylkill River Greenway Association,
Wyomissing, Pennsylvania*

The Schuylkill River Greenway Association (SRGA) is a nonprofit, membership organization situated in Wyomissing, Pennsylvania. It was founded in 1974 when a prominent local industrialist called together a group of friends to plan for the wise use and protection of the river and its banks. He wanted to ensure that the river would never again be abused.

By 1978 the organization had grown to a point where it was incorporated. A hard-working volunteer board, between 15 and 25 members, was established. Staff was hired. Today there are 4 staff members—a Managing Director, Assistant Director, Secretary, and Trails Implementor. Our main goal is to establish a greenway or linear park the length of the 135-mile Schuylkill River.

The first accomplishment of the SRGA was the campaign for scenic river status. This activity followed the federal government's Wild and Scenic Rivers Act of 1968 and Pennsylvania's similar legislation in 1972. Following an intense comprehensive study, the Schuylkill was designated Pennsylvania's first Scenic River in 1978. This designation is a noteworthy accomplishment, considering that the Schuylkill was at one time considered a dead river.

Its history is lengthy. A canal had been established in the 1820s. The main commerce was in anthracite coal mined at the headwaters in Schuylkill County and transported to Philadelphia, near the mouth of the river. The type of transportation system established, known as slack water navigation, meant that the river would be utilized wherever possible by creating a series of canals and

dams. The canal segments paralleled the river with water level controlled by locks. As the coal industry became more prosperous, washeries were constructed on the upstream tributaries, and coal dust was washed into the river itself. In the 1870s, railroads replaced the canal system as the primary means of freight transportation. The city of Reading, located on the Schuylkill, became the railroad capital of the world.

By the late 1940s the river had become so clogged and polluted that the City of Philadelphia was faced with considering another drinking-water source. The Commonwealth of Pennsylvania, under Governor James Duff, and the federal government entered into a major dredging and desilting program between 1948 and 1950. The Pennsylvania Department of Environmental Resources was responsible for the upper reaches, and the Army Corps of Engineers for the area near Philadelphia. Fifty million dollars was spent in this effort. The attitudes of riparian community residents toward the Schuylkill had become quite negative as a result of all the unfavorable attention the river was receiving.

Slowly, the Greenway Association has seen a change in these attitudes. The National Park Service (NPS) was instrumental in this transition period. We learned of the NPS's Technical Assistance Program through Section II of the National Wild and Scenic Rivers Act, which authorizes the Park Service to provide technical assistance to states, local governments, and private nonprofit groups in the development of river conservation plans. In April of 1983, we requested and received the National Park Service's

assistance. After many discussions, it was decided that a 22-mile segment of the river be studied. This area was centrally located and had urban, suburban, and rural characteristics. It was located in Berks County and included the Schuylkill River Greenway Association's headquarters.

Concern was voiced about how riparian residents would feel about the NPS coming into the area. Would this mean that land would be condemned and rights taken away? Berks County is famous for its Pennsylvania Dutch ancestry. The people are hard workers and very independent.

The SRGA felt that a partnership with the NPS would be extremely beneficial to those living within the basin. To allay fears, we decided to ask each municipality to pass a resolution in favor of the study, but we did not request any financial commitments at this point in the process. Starting with the County of Berks, we received subsequent support from the City of Reading; the Boroughs of Leesport, West Reading, and Wyomissing; and the Townships of Ontelaunee, Bern, Muhlenberg, Cumru, Lower Alsace, Exeter, and Robeson.

The NPS organized a study management team. Each municipality was encouraged to join in this effort. The Pennsylvania Department of Environmental Resources (DER) played an integral role in the partnership. Greenway members, riparian landowners, area conservation organizations, and interested citizens came together to discuss and study the river corridor. The NPS team was efficient in its work and effective in overcoming fears of a takeover. The Greenway Association provided staff assistance and an office. We organized area meetings. A questionnaire was developed and distributed. The area was canoed and cultural, natural, and historic resources noted. Remnants of the canal era were identified. This activity depended on teamwork. Our regional meeting place was Nolde State

Forest and Environmental Education Center.

When the study management team met for its final meeting in 1984, a great deal had been accomplished. The team was asked to identify and prioritize recommendations. The National Park Service did not participate in these decisions, because the agency wanted the decisions to come from area residents. A clear majority selected as its top priority the establishment of a greenway system. On the all-important question of who should be responsible for taking the next step, everyone with one exception voted for the Schuylkill River Greenway Association. The one exception was my boss, who voted for the County. In retrospect, he thinks the majority was correct as we were able to carry the project forward.

We went back to each municipality in the study area and presented a proposal for a trail feasibility study. This time there was a dollar amount assessed to each community, based on river frontage and population within a quarter-mile of the study area. The county was asked to match the amount raised, justified by the potential enhanced economic development benefits. All but 3 of the 13 municipalities entered into an agreement with us.

The SRGA collected enough money to engage a consultant with a planning and landscape architecture background. The Commonwealth paid the salary of a second individual with a forestry degree. Together they canoed, walked, and drove the area taking over 1000 slides to document their findings. Three more nonriparian communities were tied into the river system via tributary trails. The resources identified in the NPS study were included as an integral part of the subsequent study.

A detailed, colorful map was developed and a plan written, identifying points of interest by "river miles." Presentations were given to each community. As you are well aware, it is extremely important to include

the communities in the entire process. Everyone was excited.

Using this successful foundation, the SRGA was able to secure a grant from the Pew Charitable Trust. This grant allowed us to identify riparian landowners and to develop a sample "scenic river overlay." The landowner identification process was more difficult than it might sound. Berks County is the only county in Pennsylvania without a tax property map. There were also many gray areas, particularly with rights-of-way of the canal, railroad, and utilities.

The first step in drafting the scenic river overlay was to identify each community's zoning decisions. Zoning is the technical tool a community uses to determine what type of land use is desirable in any given area. As one might well imagine, each community had developed its own zoning language. For example, a single-family residential area might be labelled R-1 in one community and termed an R-2 in its neighbor's. In order to compare like designations, a generic, or common, code was established. The zoned areas were assigned their new classifications. It soon became clear which communities were failing to use zoning as a tool for protecting their riverfronts. The scenic river overlay we developed is similar in concept to a floodplain, or steep-slope, overlay. It can be uniformly applied over various regions based on physical characteristics without requiring a change in zoning. We are currently seeking funds that would allow us to promote this study more vigorously.

As far as the eight recommendations defined in the 1984 National Park Service report, all have been pursued—to various

degrees of completion. The NPS partnership added an element of prestige to our Greenway Association and to the Schuylkill River. Attitudes of the riparian community residents have become more positive, as many have joined us in our dream for a greenway system the length of the river.

We have maintained a good working relationship with the NPS. In April of this year, along with the Pennsylvania DER, we sponsored a forum on the Schuylkill. It was held at St. Joseph's University in Philadelphia and attracted 125 people. Speakers focused on the report by the President's Commission on Americans Outdoors and discussed the greenway concept on a federal, state, and local level. Descriptions of greenway implementation along the Schuylkill were presented by SRGA staff. People were enthusiastic and recharged.

To carry this spirit forward, in June 1989, SRGA and NPS joined forces with the Pennsylvania DER, Pennsylvania Department of Community Affairs, and the Tri-County Chamber of Commerce. We gathered down by the river to celebrate June as Rivers Month and to emphasize the benefits of greenway implementation. One small dog and 120 people boarded 47 canoes for a 12-mile float. According to DER officials, this was the largest flotilla in Schuylkill history. After the excursion, we gathered for a cookout at one of the riverfront parks we had floated by.

Our Greenway Association feels that the time is right for another major joint effort with the National Park Service. We have asked for their assistance and hope to have a favorable response.

River Conservation from the Bottom Up: An Atlantic Regional Approach

Elliott Gimble, QLF/Atlantic Center for the Environment, Ipswich, Massachusetts

INTRODUCTION

The Atlantic Region may be defined as northern New England and the easternmost provinces of Canada, that is, the northeastern reaches of Maine, the provinces of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland-Labrador, and the Quebec shoreline of the St. Lawrence River. Spread over roughly 175,000 square miles are fewer than 2.5 million people.

The region has been shaped by its waters. Punctuated by thousands of islands, inlets, and bays, the approximately 15,000 miles of Canadian Atlantic shoreline are 15 times longer than their straight line projection. The "Downeast" coastline of Maine is similar. On average, Maine has one linear mile of river for every square mile of land area. Rivers cross and recross international borders.

Rivers play an important ecological and historical role in the Atlantic Region. They were the first transportation routes for Indian groups like the Micmac, Passamaquoddy, and Miramichi, searching for game after a short growing season. Explorations by the French and English followed in the sixteenth and seventeenth centuries. In 1604, Samuel de Champlain founded the first European settlement north of Florida in North America on the St. Croix River (Maine/New Brunswick). In the 1800s, communities looked to the natural resources along the region's rivers, and local economies were built on lumbering, fishing, fur trading, and farming.

Today, traditional river uses such as transportation, drinking water, and even basic ecological services compete with hydropower demands, waste treatment and

disposal, increasing recreational use, and second-home development. For example, only 5% of New England's rivers remain free-flowing, and demand for alternative energy sources such as hydropower will intensify into the next century as other sources prove too economically and environmentally expensive.

Economically, the Atlantic Region has remained natural resource dependent. The gulfs of St. Lawrence and Maine harbor some of the richest fishing grounds in the world. Unfortunately, overfishing in the 1960s and '70s has severely depleted stocks, and the entire region suffers from high unemployment and low economic standing. In Atlantic Canada, unemployment is roughly 15%, compared with 10% for Canada as a whole. Unemployment in the northeastern counties of Maine is over 10%, while in other more populous southern counties it is under 5%.

Forestry, especially the pulp and paper industry, has become a major economic activity in the region, but it, too, is unsteady, affected by the vagaries of demand, competition (sometimes intraregional), and the impacts of spruce budworm and acid deposition. Forest companies are seeing their holdings increase in value more as second-home subdivisions than as timber lands.

Large timber companies are selling their highest-valued land, much of it along shorelines—oceanfront, lakefront, and riverfront. In 1988, for example, Diamond Occidental Forest, Inc., sold almost one million acres across New England, much going to speculators. This land was then repurchased for protection by state governments at premium prices (Boucher, 1989).

In response, Congress authorized the

Northern Forest Lands Study, a two-year planning initiative focusing on changing ownership patterns and management strategies within 32 million contiguous acres of forest lands, from northern New York to the Maine coast. Increased land and water pressures have reinforced the need for more effective management and conservation measures in the region.

UPRIVER—THE ATLANTIC CENTER'S RESPONSE

The Atlantic Center for the Environment, a division of the Quebec-Labrador Foundation (QLF), has been active in the Atlantic Region for over 11 years, working to build local support for conservation through education, research, and policy programs. QLF is an independent, charitable, community service organization legally incorporated in both Canada and the United States. The Atlantic Center, through its internships, offers programs year-round in the areas of river conservation, research and natural history, inter-regional exchange and policy, information services, and leadership development.

Opportunities for conservation and sustainable development have evolved over this period; environmental awareness in the Atlantic Region is high but environmental pressures are also increasing. A coordinated, holistic approach to conservation, that takes into account the region's diversity of jurisdictions and perspectives, is needed.

Overall, this region is similar to rural areas elsewhere. Conservation here cannot ignore economic and political conditions, which can present difficult challenges but also can provide opportunities for comprehensive, long-range planning. Thalman (1986) identifies some of the characteristics that rural areas share, characteristics which can dictate conservation strategies in these regions:

1. often rich in natural resources
2. low population densities
3. isolated communities tied by strong traditional values, culture, and institutions
4. economically underdeveloped
5. often economically dependent on outside interests and forces
6. lower formal education levels
7. relatively low political power, by nature of lower population density, education levels, etc.
8. strong sense of regional identity, individuality, and self-reliance
9. dislike of regulations and viewpoints imposed by outsiders, including government
10. less regulation of development
11. scarce support structures for conservation

A letter from a regional land trust director in Maine brings these points home (Brooks, personal communication):

The biggest problem, I have found, in attempting to equate the experiences of various land trusts, is the great difference between a trust operating in a relatively wealthy, suburban setting and one like ours in a much poorer, less populous area. For example, the Quoddy Region as we currently define it encompasses some 17 towns and territories, with a total population of well under 10,000 and an annual average per capita income of perhaps \$10,000 at most. Even a single-town trust in southern New England will likely draw on a considerably bigger population base with a much higher income level. These differences color our approach to every problem.

Recognizing the Atlantic Region's important river and land features and the conservation needs expressed above, the Atlantic Center launched UPRIVER, an initiative designed to invigorate and support river and watershed conservation in the region. To date UPRIVER projects have recognized several critical organizational needs for river conservation groups in the region, including the following:

- recruit and support good leadership
- empower and organize groups for long-term effectiveness
- provide opportunities for on-going training
- increase understanding of issues through resource inventory and monitoring

UPRIVER goals are to:

- strengthen the growing network of river trusts and watershed associations
- develop sound river protection plans through technical assistance
- implement river management plans and develop water quality monitoring programs to form an information base for local groups
- build alliances among public agencies and regional and local river protection groups

Project areas for UPRIVER are:

- **Technical Support.** Providing resource inventories and assessments and assisting communities in their own water-monitoring programs, we assist groups to set management goals, acquire funds, and make sound decisions based on sufficient information.
- **Education and Leadership.** Historically, the Atlantic Center has provided outdoor and conservation education opportunities for young people in the region; these programs have continued under UPRIVER. In addition, inter-

regional and international exchanges and workshops help foster leadership allowing individuals to improve organizational and practical conservation skills.

- **Policy and Planning.** Through contacts at the local, regional, and national levels, the program assists groups by directing appropriate agency resources and attention to their efforts, thus offering local leaders opportunities to generate support at the policy level.
- **Publications.** The Atlantic Center publishes findings from UPRIVER projects, including policy and inventory reports, and occasional papers, to inform various constituencies on environmental and policy issues.

Based on a community-oriented approach, UPRIVER continues to be an effective catalyst and facilitator for regional conservation efforts. Employing project associates (interns) from natural resource undergraduate and graduate school programs, the Atlantic Center provides cross-cultural and professional experience to college students. At the same time, within a framework of long-term regional conservation, we contribute professional information and services to organizations and agencies in the Atlantic Region.

PARKS AND CONSERVATION IN THE ATLANTIC REGION

There are some real difficulties in establishing parks, linear or otherwise, in the Atlantic Region. First, parks are generally easiest to establish on public lands, but New England is mostly private, with the lowest ratio of publicly owned to privately owned land of any forested area of the country (Ireland, 1984).

Second, public perceptions of parks are not always favorable. There is a great sense

of individual rights and independence in the Atlantic Region, an area where natural and social conditions encourage residents to voice their own opinions and to make their own choices. Nothing says this better than New Hampshire's license plate slogan: Live free or die.

Groups may take offense at what they perceive as outside interference. Recently, residents in two towns along the coast of Maine voted unanimously to oppose any designation of their area as a National Natural Landmark or consideration of the area as a national park. A group leading this opposition stated as its goal:

to protect the Downeast way of life, including both its political freedoms and its rural conservation ethic, from federal and state intrusions, promoted and encouraged by outside pressure groups seeking to exploit our region for purposes of strict preservationism or mass recreation at the expense of the local people (Holmes, 1989).

Area residents are rightly concerned about outside growth or no-growth pressures. The picture, however, is not so black and white.

Groups can and do work with state and federal agencies to set aside parks. A case in point, also from coastal Maine, is the recent announcement that the state will purchase Shackford Head, a 90-acre peninsula of outstanding scenic and recreational significance. The purchase was proposed and spearheaded by the Eastport Land Trust, a small group of dedicated area residents. Funding for the purchase comes from the \$35 million Land for Maine's Future Fund, administered by the State Planning Office.

Another fine example is the designation of Wildcat Brook in New Hampshire for National Wild and Scenic River status. There, residents of Jackson, New Hampshire worked with the National Park Service, state agencies, and other groups to develop a conservation strategy for the waters that ran

through their town. After identifying various protection alternatives, the town voted to support the designation at their town meeting.

Park preservation is just one conservation tool, and it can take many forms. Other instruments, such as conservation easements and conservation restrictions, can also help do the job. Finally, no matter what the management tools, effective conservation depends on public cooperation through public participation.

GROWTH OF PUBLIC INVOLVEMENT OPPORTUNITIES

The public is justifiably concerned with the state of the world's environment, and awareness seems to be reaching new heights. From rain forests to global warming to solid waste issues, people need to know exactly what they can do. They need to understand how their lifestyle choices affect the environment. There is no better time than the present to take advantage of public attention on environmental issues, directing it towards effective and sustainable solutions.

River protection is no exception, and recent trends in river conservation suggest stronger public involvement, by necessity if not by luxury. A recent report on river conservation in the 1990s produced for American Rivers notes that

[r]egardless of actions taken at the federal and state levels, optimum conservation of the nation's river resources requires effort at the local level and in the private sector. Indeed, if river protection is to succeed, it must be both a "bottom up" and a "top down" process (Giffen and Parkin, 1989).

This approach will require leadership and cooperation at federal, state/provincial, and local levels; technical and financial support for smaller conservation organizations; and increased public support and participation.

Recognizing the increased role and opportunity for community action as well as a burgeoning need for technical assistance, the U.S. National Park Service has established a Rivers and Trails Conservation Program designed to assist states, communities, and private organizations in promoting conservation of rivers and trails. The program provides direct staff involvement to selected projects and has been a very successful catalyst and support mechanism for local and regional conservation efforts for these linear resources.

Environment Canada recently announced an Environmental Partners Fund to support nonprofit, nongovernmental conservation initiatives. The fund will be dispersed over five years and totals \$50 million; it can be used for projects that rehabilitate and enhance the environment or for waste disposal and recycling.

These developments have taken place, in part, as recognition of the importance of the growing number of small local or regional environmental groups. Land trusts provide a good example, have doubled in number over the past decade. Over half of the 743 land trusts listed by the Land Trust Exchange (Land Trust Exchange, 1989) have no paid staff, and as many have budgets under \$10,000. Sixty-six percent are active in wetland protection, and half or more are involved in protecting watersheds, rivers, lakes, or forests.

While the Atlantic Region has its share of these groups, it has plenty of room for more. Almost half of the land trusts listed are in New England; Maine alone has sixty. In Atlantic Canada, there are few such groups but a growing movement and need.

CONCLUSION

This recognition of, and growth in, community participation reinforces the need for a holistic, regionwide approach to conservation in areas like the Atlantic Region. The area is, like other rural areas, tied to its natural resources economically and culturally. Park and other planning efforts must recognize this interconnection and the need for strengthened institutions to carry out conservation efforts.

Linear parks have a place in the Atlantic Region. Protection along river banks is an important first step in providing for a balance of water uses from recreation to industry to habitat requirements. Full protection cannot exist, however, without local institutions and the support they can provide. Small land and watershed associations have needs that also must be addressed even as parks are being considered, including:

- leadership development,
- information and technical assistance,
- opportunities for information sharing and partnerships.

In the Atlantic Region, we believe the UPRIVER model works well, serving the needs of human and natural communities within the context that conservation generally takes in a rural setting. But these efforts will be in vain if the organizations that remain in those communities do not have the resources and expertise available to carry conservation forward.

UPRIVER is a step in the direction of strengthening community organizations and their involvement in conservation for the difficult economic and environmental choices that lay ahead. Ultimately, the future is in their hands.

REFERENCES

- Boucher, N. "Whose Woods These Are," *Wilderness*, Fall 1989, Vol. 53, No. 186.
- Brooks, A. Quoddy Regional Land Trust, Inc. Letter, August 15, 1989.
- Giffen, R. A., and D. Parkin. A Rivers Conservation Agenda: 1990 and Beyond. Land & Water Associates for American Rivers, Inc., USDA / Forest Service, USDI / Bureau of Land Management, and USDI / National Park Service. Washington, D.C., August 1989.
- Holmes, M. J. "Landmarks Report Delayed Until Park Service Responds," *The Quoddy Tides*, Eastport, Maine. August 11, 1989.
- Irland, L. "Recovering the First Frontier," *The Nature Conservancy News*, Arlington, Virginia. May/June 1984.
- Land Trust Exchange. 1989 *National Directory of Conservation Land Trusts*, Alexandria, Virginia.
- Thalman, D. "Building Support for Environmental Conservation in Rural Areas," Atlantic Center for the Environment, Ipswich, Massachusetts. Unpublished discussion paper, October 1986.

SUGGESTED READINGS

- A Citizen's Guide to River Conservation* by Rolf Diamant, J. Glenn Eugster and Christopher J. Duerksen. The Conservation Foundation, Washington, D.C. 1984.
- A practical guide to grassroots rivers conservation including descriptions of basic conservation tools and strategies and case studies.
- Saving America's Countryside: A Guide to Rural Conservation* by Samuel N. Stokes, A. Elizabeth Watson, Genevieve P. Keller, and J. Timothy Keller. The National Trust for Historic Preservation, John Hopkins Press, Baltimore, Maryland. 1989.
- A comprehensive reference guide to protecting rural community resources, including natural, historic, scenic, and agricultural. Includes twenty-eight case studies of successful efforts from communities across the United States.
- The Riverwork Book* prepared by Mid-Atlantic Regional Office, Division of Park and Resource Planning, U.S. Department of the Interior, National Park Service. 1988.
- A step-by-step process for community-based river protection efforts including how to set goals, negotiate, and generate action.

Park Watch: Enlisting Citizen Support to Protect Parkway Values

James E. Fox, Blue Ridge Parkway, Asheville, North Carolina

INTRODUCTION

In recent years, public use of the Blue Ridge Parkway has increased dramatically. By the late 1970s, the numbers of annual visitors exceeded 15 million. Along with the sharp increase in visitation came a corresponding increase in protection problems: threats to parkway resources, vandalism, break-ins of unattended autos, fires, stranded motorists—all matters needing immediate attention from rangers. However, in the face of ever increasing numbers of visitors, the number of rangers to deal with these problems had not increased in many years. The ranger force was stretched very thin, especially during peak visitor months.

In 1982, Park Ranger Tony Bonanno developed a new program called Park Watch to assist the park staff in serving parkway visitors and protecting our resources and facilities.

WHAT IS PARK WATCH?

Many cities across the United States have instituted programs called "Neighborhood Watch" or "Community Watch." The goal of these programs is to encourage residents to keep an eye on their neighbors' property and on the community as a whole and to report any unusual or suspicious activities to local authorities. In short, all citizens make a commitment to look out for each other's welfare.

Park Watch is a similar program, adapted to a park setting. The objective of Park Watch is to encourage park visitors, neighbors, and local businesses and agencies to take an active role in protecting and preserving their park. Park Watch asks all

members of the public to be alert not only for vandalism and other criminal activity, but the whole spectrum of park protection problems including safety hazards, fires, lost persons, accidents or injuries, and even cows on the road. Park Watch asks for help in identifying threats to parkway resources such as illegal tree-cutting, littering, polluting, poaching, or unexplained changes to parkway flora or fauna. People are urged to take time to report anything needing a ranger's attention. By enlisting many extra eyes and ears, there should be fewer serious problems, and, through more prompt notification, rangers should be able to respond more quickly to emergencies.

Park Watch is also intended to make visitors more attentive to their own safety and to the protection of personal property. Visitors are urged to lock valuables in car trunks, carry them along when away from the vehicle, or leave them at home. Unfortunately, criminals also visit national parks. Some specialize in breaking into unattended vehicles in search of cash or valuables.

A final objective is to warn all who would visit the parkway to commit crimes. Park Watch is intended as a visual deterrent. If a vandal or auto burglar understands that not only the rangers but also parkway visitors and neighbors are watching, he or she may decide not to carry out illegal activities.

MARKETING THE IDEA

The parkway staff developed a multimedia approach to informing the public of Park Watch. Landscape architect Harry Baker won an award for developing the Park Watch logo, consisting of an eagle's head and the

words "Park Watch" enclosed in a circle. This logo appears on all Park Watch signs and literature on the parkway and has also been widely adopted by other parks. The logo is not copyrighted. We encourage its use by other agencies or groups who develop a Park Watch program.

The Maintenance and Engineering Division developed and installed Park Watch signs, which were placed at conspicuous locations along the parkway. The original signs exhibited only the logo, but more recent signs include a telephone number for reporting emergency information.

Interpretive specialists assisted with the layout and design of printed messages. We use colored fold-over brochures and posters, and also include Park Watch messages on nearly all handout literature. Our cooperating association, Eastern National Park and Monument Association, has assisted by covering some printing costs and by helping with distribution of the Park Watch message. Our concessioner helped out by posting Park Watch information and by providing brochures in motel rooms and other facilities.

Bill Banner, of Channel 13 WLOS-TV in Asheville, has been instrumental in developing several 30-second public service announcement tapes advertising Park Watch. These tapes were distributed to 20 area television stations. News releases have been sent to area radio stations and local print media, generally at the start of each visitor season.

The active involvement of each parkway employee has been stressed. Maintenance workers along the roadside, volunteers, campground hosts, rangers, and radio dispatchers all must be prepared to handle incoming reports from the public to ensure that critical information is properly processed and appropriate action taken.

A Park Watch Committee comprising both staff and field employees was established to meet from time to time and to work

as a team to seek new and better ways to get the message out and make the program run smoother. New ideas from the committee have kept the program vital and growing through the years.

Because of the great length of the parkway, some visitors have problems reporting critical information. If they were unable to contact the local ranger station, they had to make a long distance call to the parkway dispatcher in Asheville, or else not report the incident at all. The problem was further compounded by the fact that the Parkway Dispatch Office does not operate 24 hours per day. As a result, an unknown number of important calls were never received.

Starting in late 1987, the parkway contracted with an answering service in Asheville to receive, toll-free, incoming Park Watch calls 24 hours per day, seven days a week. For convenience and easy recall, the number 1-800-PARKWAY was used. In theory, visitors should be likely to remember this number, even if they see it only once. Later, if they wish to report an incident, they can do so from any telephone in North Carolina or Virginia, at any time of day, and at no charge to the caller.

As expected, many people now take advantage of this opportunity to contact parkway officials since it is so convenient. During hours of operation, incoming Park Watch calls come directly to the parkway dispatcher on duty. The dispatcher, in turn, relays the information to the appropriate ranger by telephone or radio. After the Dispatch Office signs off for the day, the contractor receives each call and either relays information or patches the caller directly through to a ranger in the appropriate district. Whoever takes the incoming call answers with the words "Blue Ridge Parkway Emergency." Callers who request parkway information are given the commercial parkway number.

PARK WATCH RESULTS

One of the most frequently asked questions about Park Watch, and one of the most difficult to answer, is how successful has it been. There is no precise way to measure the number of visitors who report important information to us because of Park Watch. No doubt many who call in would have taken the trouble to contact us even without the program. Similarly, resource damage, violations, and accidents that never occur because of Park Watch do not appear as statistics. However, after several seasons of experience, we feel we can at least make some general statements concerning the success of the program.

Many Park Watch calls are being received. The number of calls per month continues to grow as the existence of the program becomes more widely known. This level of public use of the system in itself attests to its success. Rangers and dispatchers report that we often learn of accidents or other incidents much more quickly than before Park Watch. Prompt reporting is often critical in responding to serious traffic accidents with injuries and in initiating searches for lost persons, particularly in inclement weather.

Year	Visitors (millions)	Larceny Incidents	Vandalism Incidents
1981	17	158	167
1982	18	124	131
1993	13	132	182
1984	19	92	191
1985	21	167	191
1986	21	138	252
1987	23	94	147
1988	26	104	154

Table 1.

Since Park Watch is but one aspect of the Blue Ridge Parkway's protection program, it is difficult to isolate its impact on protection activities. However, it is interesting to note that immediately after implementing Park Watch larcenies and vandalism decreased and have remained relatively stable ever since. This change is particularly noteworthy since visitation has continued to climb every year, topping 25 million in 1988. Table 1 shows the trends in recent years in visitation, larceny, and vandalism.

FUTURE OF PARK WATCH

Our committee continues to explore new ways to refine our system to make it work more efficiently. Presently, we are considering the use of Traveler Information Service (TIS) short-range radio transmitters to give visitors a brief interpretive and Park Watch message as they travel the parkway.

Another new-technology medium recently introduced at several parkway visitor centers is computerized visitor information terminals. Visitors may push buttons to select the information they wish to have appear on a television monitor. Among the information provided is a Park Watch message.

Technology now exists to include Park Watch as part of an integrated telephonic information receiving and transmitting service. Theoretically, a person could dial a single number and request road information, parkway literature, or locations of colorful wildflowers or fall leaves, as well as report Park Watch information. Presently, we are exploring this possibility.

SUMMARY

Findings so far suggest that Park Watch has great potential as an inexpensive preventative program to enhance efforts to protect park resources, property, and visitors. Park Watch

is easily integrated with existing protection efforts. The premise that the general public is willing to take an active part in protecting park values, once their level of awareness is heightened, appears to be valid.

Park Watch requires a team effort on the part of park staffs. Protection, maintenance, interpretation, and administration personnel all have a significant role to play. However, we have found it essential to designate a single coordinator to pull all efforts together and to keep the program on track. A committee has also prove useful for brainstorming ideas to refine and improve Park Watch.

Methods to measure objectively and precisely the impact of Park Watch are still lacking. However, statistical summaries suggest that Park Watch is a positive force in reducing crime and resource damage and in expediting response to serious incidents. The number of incoming calls, an element that can be measured, reflects strong and growing public participation.

To date, we have sent information packets, on request, to over 100 park areas that were considering implementing Park



Figure 1. Landscape architect Harry Baker won an award for the Park Watch logo.

Watch. Unfortunately, we do not know how many have carried out implementation, but we are aware of several that have done so. Their responses to the program have been as positive as our own.

If you wish to discuss Park Watch or to obtain information packets for starting a program, you may contact Park Watch Coordinator, Blue Ridge Parkway, 200 BB&T Building, Asheville, NC 28801.

Vigilantes, the Neuse, and Sure Salvation: Evolving Advocacy for Greenways

*William L. Flournoy, Jr., North Carolina Department of Natural Resources
and Community Development, Raleigh*

INTRODUCTION

vig-i-lan-te, noun; *one who is alert, watchful.*

Raleigh was the first city in North Carolina to undertake a greenway program. Today it is recognized as a national leader in community-wide linear open space development. To begin to understand how Raleigh attained this position of respect, it is necessary to reflect on the physical, political,

and social conditions that existed nearly 20 years ago, as the city began to formalize a linear open space plan.

As the capital city, Raleigh is one of the few cities in the United States that was planned prior to its development. Its location along a ridgeline was designed with a grid layout and five public squares, with the central square being the site of the capitol building. Over the next 180 years, the city grew down the hillsides toward the major

drainage ways that flow into the Neuse River. This grid pattern was abandoned shortly after development spread beyond the original city limits. Up until the 1950s, numerous neighborhood parks were left along streams between the curvilinear streets of the expanding city; however, after the Korean War, the development community began to use large earth-moving machinery in their businesses. This technology radically changed the way growth was to occur and overpowered the respect that had historically been given to the natural characteristics of the landscape.

Raleigh has traditionally had a council-manager form of government. The council was elected at-large and the mayor chosen from among its ranks. By the late 1960s there was increasing public debate over whether this system was truly representative. A well organized business community seemed to promote and finance candidates more successfully than it did neighborhood interests. The fact that virtually every mayor in memory was a developer made the council target for neighborhood activists, who were outraged about rezonings, thoroughfare plans, and development, all of which they perceived as threats to their homes and lifestyles.

By the late 1960s and early 1970s the environmental movement was washing like a wave across the nation. Having learned from the civil rights and anti-war movements, citizens inclined to promote environmental protection were well equipped to plead their cases. The city was rife with environmental issues. Road proposals that would have taken public park lands and wetlands raised the issue of disappearing open space. Recurring flood damage begged the prudence of development in floodplains. Streams that ran red and were, like the Platte, "too thick to drink and too thin to plow" proved to be catalysts for debate about sediment control.

Into this arena moved the linear open space issue. Having been considered as a

concept in Raleigh's planning efforts since the era of the City Beautiful movement, and later offered as green fingers stretching throughout the city, "greenway" as a term of art was first proposed in three pages of the 1969 parks and recreation master plan, "Park With a City In It." The way in which the Raleigh greenway system was transformed from a linear open space concept into a reality is a story of power, enlightenment, participatory democracy, and survival of the fittest.

THE NEXT STEP

In retrospect, it is obvious that a simple, linear process could not have succeeded in creating a greenway system. A strategy of establishing a city policy, amending the comprehensive plan, securing a budget, and assigning operational responsibility was too simple and even inappropriate in this case. At the time it was not obvious that this linear approach would not work, but it was clear that the existing institutional structure would not support creation of a greenway system. What evolved, more through cooperation and shared interests than through a specific strategy, was a nonlinear approach. Institutional issues were addressed pragmatically, and once resolved they were fed back into the process of addressing the next institutional issue. This approach had a cumulative effect of changing the foundation upon which civic and business decisions were made, and it has resulted in the creation and metamorphosis of the greenway system.

During the 1960s, a program between the City of Raleigh and North Carolina State University's School of Design was established, whereby a small grant was made each year to support a student project of benefit to the Parks and Recreation Department. In 1970, a request was made to use the city's grant to study the greenway concept in more detail. The mayor at the

time was the developer responsible for a regional shopping center in a local floodplain. Having been on the receiving end of endless criticism about anticipated traffic and environmental problems resulting from the shopping center project, the mayor was hypersensitive about focusing any more attention on issues relating to streams or floodplains. The study request never saw the light of a council meeting, and a different study request was later substituted.

In 1971, the School of Design reapplied for a grant to study greenways. The city had a new mayor, also a developer, but one who did not have the baggage of past investments. He also had a bring-everyone-together approach to issues, so the study was approved with a committee of representatives from city agencies assigned to oversee its preparation.

The resulting report was "Capital City Greenway," 100 pages of primer and consciousness-building. The report discussed a broad range of greenway objectives and benefits. One critical concept is the fact that linear open space has significantly more perimeter or edge than traditional consolidated parks. This edge may be used to buffer competing land uses and soften the urban image. Linear open space can connect traditional parks and other activity centers, such as schools and shopping centers. It can also accommodate popular recreation activities, such as jogging, walking, bicycling, and canoeing, which are linear activities that may not be compatible with traditional urban parks. When associated with streams, which are also linear systems, the open space allows flooding to occur without damage to buildings or disruption of the local economy or individual lives. Environmentally, linear open space acts as a vegetated buffer along streams to protect water quality and fragile natural ecosystems such as wetlands. Further, the urban environment is enhanced through air quality,

temperature, and noise moderation resulting from the conservation of vegetation. Finally, these areas function as wildlife corridors, allowing a greater diversity of animals to travel through and survive within urban areas.

The report noted the increasing need for recreational opportunities close to home, a trend that has continued and become even more important with today's demographics, economy, and lifestyles. It also included a methodology for determining greenway widths, the roles of various actors for creating greenways within the urban development process, and several design considerations needed to bring the greenway concept into practice. Transmitted to Raleigh's city council in the fall of 1972, the report was officially "accepted," but it then disappeared within the city administration.

THE RELUCTANT BRIDE

It is not surprising that the greenway concept did not immediately take root in city programming. Having been promoted more by the public than by the city's administration, there were political, institutional, and budgetary barriers to overcome. The city government was moving in a direction that did not include a significant new program. Even the representatives of city agencies who participated in the preparation of the Capital City Greenway report had not reached a consensus on what they wanted the greenway to be.

Raleigh's planning director was a strong advocate for linear open space and felt that the entire length and width of the city's floodplains should become greenways. This position seemed to be his response to the growing recognition that controls were needed on floodplain development.

On the other hand, Raleigh's parks and recreation director advocated the use of sidewalk-width greenways to minimize conflict with development interests and to

make the system more economically feasible. From his perspective, the continuity of the greenway's trail system was the key factor in its design.

In the early 1970s, there was virtually no one in the city administration who could deal with the environmental concepts inherent in greenways. New environmental protection measures were just becoming part of federal law, and the role of states was in the process of being defined. Moreover, it would be years before local governments would be compelled to undertake even the most rudimentary environmental protections. Nevertheless, it was clear that the greenway issue was inexorably tied to issues that had to be acted upon before there would be a reasonable chance for greenways to progress.

A PARTIAL SOLUTION

Two related issues began to move through the city's and then the county's governing processes. After years of public discourse, a flood in early 1973 thrust the issues of floodplain regulation and sediment control to the forefront. These issues were stalemated until a second flood in mid-1973 occurred, tipping the scales and persuading local officials to approve floodplain and sediment control regulations.

Prior to enactment of these regulations, all land was considered to have equal value, regardless of its environmental characteristics. From that time on, however, real estate interests began to realize that floodplains were less developable, and that areas with steep slopes and erodible soils had additional costs included in their development. About the same time, Section 404 of the Clean Waters Act of 1977 further restricted the filling and development of wetlands. The environmental and fiscal debts from unwise development would no longer be passed on to or be borne by the public.

While none of the new environmental

regulations created a greenway or gave the public any right to use the affected areas, they were invaluable in allowing the greenway concept to mature. All of the regulations were disincentives to development in the areas along streams that were targeted for the proposed greenway system. The changes in perception, attitudes, and market values that accompanied the new regulations allowed greenways to compete for a place in the urban landscape.

POLITICS: THE ART OF THE POSSIBLE

Other changes occurring in Raleigh at this time were bigger than greenways but accommodated the continued institutionalization of the greenway concept. Prior to 1974, citizens had successfully petitioned for a referendum to change the process for electing their city council and mayor. The new process involved electing several council members representing specific districts, several at-large council members, and the popular election of the mayor. This reform, it was argued, would give neighborhood candidates a competitive chance to gain office and would produce a more representative form of government. Voters approved the new process.

In 1974, two years after the greenway report had been accepted by the city, the new, more neighborhood-oriented council agreed to establish a Greenway Commission. This body was to consist of 18 citizens who would advise the council and administration on matters of greenway creation. Yet even this step forward was not without both external and internal compromise. Externally, nearly a dozen greenway advocates were meeting with their champion from the new city council. Their preference was to seek a greenway authority with independent budget and decision-making power, although this concept was politically impractical.

Greenway advocates did not want greenways added to the existing Parks and Recreation Commission, because they thought a new program could not mature in competition with established parks and recreation activities. They also felt that greenways should not be added to the existing Planning Commission because this body did not have implementation capacity and should probably not be given such responsibility. The compromise was to create an advisory Greenway Commission with the Planning Department providing staff, and the Parks and Recreation Department providing construction and operation personnel. Internally, council members agreed to the establishment of the Greenway Commission only after each member was assured two appointments, even though this compromise produced an almost unworkably large commission.

The city administration also had roles to plan and compromises to make. Historically, the Planning Department performed comprehensive planning and administered land use regulations, but it had little responsibility for facility design. It inherited this new responsibility when the Greenway Commission and greenway program were created. Until this time, the Parks and Recreation Department had provided for organized recreation activities, but unlike league sports, greenways had no organized and defined constituency. The new greenway program required the department to seek out a new advocacy group and to support a program that was important for both its environmental and recreational benefits.

The greenway program benefited from the changes in city council elections. Its prospects were also improved by the adoption of floodplain and sediment control regulations. On the other hand, the greenway program required the city administration to expand the perspective and breadth of its services and operations. These major

institutional changes were brought about by citizens' involvement in their government.

THE CONSTITUENCY: AN EVOLVING ADVOCACY

Normally, when citizens seek specific actions from their government, there is an identifiable constituency. In the case of Raleigh's greenway program, that has not always been true. What has been most perplexing to decision-makers is that the source of greenway advocacy has continually changed. It was never clear whether popular support was an "inch wide and a mile deep" or "a mile wide and an inch deep."

In the early years of greenway concept development and program creation, there was an intentional and concerted effort towards public education. This was carried out first by citizen-advocates as a means of increasing public support, and then by the Greenway Commission. The greenway message of environmental, recreational, city-form, and quality-of-life benefits was delivered to any group that would listen. Hundreds of presentations occurred over a three- or four-year period.

The League of Women Voters was active on a broad range of issues, including participatory government and citizen involvement through neighborhood-created organizations. The league also had an environmental agenda reflecting new national concerns. Floodplain regulation, sediment control, and greenways became a focus for carrying that agenda forward locally. Once the greenway program was established, the league moved on to other issues.

The greenway issue provided a positive topic and high visibility for the rapidly expanding Sierra Club. Typically an organization is only as good as its individual leaders, and the local Sierra Club group had several excellent leaders who were greenway advocates. Funds were raised for a

sophisticated multi-projector slide show on the greenway concept. This show replaced all previous educational programs because of its quality and the energy of its presenters. The club could also be counted on to take an adversative position on the need for floodplain regulation and sediment control. Once the greenway program was established, the club continued its direct advocacy by getting its leaders appointed to the original Greenway Commission, but the club also began to broaden the scope of its overall interests.

Wake Environment was another local organization that supported environmental management through land use decisions and greenways. The rational message and persuasive approach of its leaders ultimately made Wake Environment a victim of its own success. Most of its leadership was absorbed into appointed boards and commissions or elected into office. The success was instrumental in the establishment of the greenway program, but it led to the demise of the organization.

After 1974, the character of greenway advocacy changed as the issues moved away from program creation and toward greenway development. There was a year or so of quiet activity as the necessary institutional planning occurred and the program's direction was charted. Once the implementation of the greenway system was begun, neighborhood groups became the advocates. Garden clubs, homeowners associations, and similar groups competed for priority positions on the greenway construction schedule. Not surprisingly, as their individual projects were completed, these groups became less involved, causing a constant turnover of advocates and an appearance of diminished support for greenway programs.

The nature of greenway advocacy took another turn after 1980. It became increasingly obvious that there was a need for coordination among local governments to

ensure that greenways continued and interconnected across jurisdictional lines. The Triangle Greenways Council (TGC) was established to promote greenways in the six-county Triangle region. Although their dream is for a greenway encircling Raleigh, Durham, and Chapel Hill, their work has remained strictly local. Efforts of TGC members have been directly or indirectly responsible for the creation of separate greenway programs in the City of Durham, the Town of Chapel Hill, and in Wake County. Other communities within the Triangle area continue to accumulate linear open space, even though they have yet to establish greenway programs. Volunteers from the TGC are presently constructing a 40-mile section of the Mountains-To-Sea trail at Falls Lake, and trails at Jordon Lake and in Duke University Forest. The presence of TGC has subtly elevated the greenway issue throughout the area.

The Triangle Land Conservatory (TLC), a progeny of the Triangle J Council of Governments, was created to fill the need for a private organization to actively conserve land in an area of rapid urbanization. TLC is presently coordinating the preparation of biological inventories for each of the region's six counties. These inventories are the foundation for private and public efforts to protect the special places and resources described within each county inventory. Many stream corridors are identified in the inventories as existing or potential greenways. The majority of lands owned by TLC includes streams, such as the 250-acre White Pines Preserve at the confluence of the Deep and Rocky Rivers. The existence of TLC has added a new dimension to greenway efforts, even though its conservation goals are much broader.

The constituency for greenways has changed significantly over the years. It has evolved from groups with multiple interests focusing on greenways for Raleigh to single-

interest groups focusing on greenways for the region. Now that greenways have been built, it is clear that they are heavily used facilities. Many developers are donating open space for greenways and using the proximity as a marketing tool to increase the value and desirability of their projects. In Raleigh, greenways have come to be expected as a community facility, but greenway users still remain in an unorganized constituency.

TODAY AND TOMORROW

Over the past two decades, tremendous strides have been made to accommodate greenways into the fabric of urban development. Even today this metamorphosis is continuing.

Several years ago the Greenway Commission was merged into the Parks and Recreation Commission. This change was viewed with some skepticism by greenway advocates, since it was still uncertain whether the program was mature enough to compete with traditional parks and recreation programs. The concern is now being replaced with renewed faith in the program as the transition appears to be moving smoothly.

Public advocacy groups continue to be on the cutting edge of greenway activity. The TLC and the TGC joined forces in 1985 to prepare a report entitled "Future of the Neuse River." This document asks what role the river will serve in the community's future, and it has been a catalyst for public policy discussion. To increase public appreciation of the river, these groups have sponsored canoe trips along the river each spring and fall. They have also adopted the upper Neuse River as part of the North Carolina Department of Environment, Health, and Natural Resources' Streamwatch Program. The groups have also gathered existing public information on the extent of floodplains and wetlands, as well as the adjoining landowners along more than

twenty miles of the river. This information is being used in an effort to secure improved management for conservation purposes or donation of conservation easements or fee title through contacts with the more than 300 adjoining landowners. Having just begun, this massive undertaking puts these nonprofit organizations in the forefront of linear open space efforts in the region.

The city's administration, which was once reluctant to pursue greenways, is now embracing the program. A major sewer line proposed along more than 10 miles of the Neuse River presented an unprecedented greenway opportunity. By seeking greenway and sewer easements concurrently, the city has secured 5.8 miles of the needed greenway right-of-way. The remaining greenway lands can be accumulated as specific subdivision and land use plans are received for city review and approval. In another recent development, Wake County, the municipalities with land use jurisdiction along the river, and private interest groups have begun a Neuse River corridor study. The results of this study should be a coordinated effort and a plan for public protection and use of the river.

Regulations continue to play an important role in greenway development. Raleigh was the first North Carolina city to adopt development impact fees. Through this system, the provision of greenway open space can be deducted from impact fees owed. This approach perpetuates the greenway network in the absence of a mandatory dedication-of-open-space provision, which has never been included in the city's subdivision requirements. Nationally, Section 319 of the Clean Waters Act Amendments requires every state to prepare a plan for controlling non-point source pollution or surface water runoff. This program is expected to be implemented in the 1990s. Since vegetation buffer strips along streams are an accepted method for

controlling agricultural runoff, it is anticipated that greenways may very well become an accepted method of controlling urban runoff.

ON REFLECTION

Raleigh's greenway efforts have been a success, but not a total success. Retrofitting the greenway into parts of the city that were developed prior to 1970 is still problematic. One neighborhood wanted a greenway so much that it raised \$300,000 to buy out a developer and save the last remaining open space. Unfortunately, this is not a universally applicable solution for completing the greenway network. The opportunities to move previously developed structures to make room for a greenway corridor have also been limited and expensive. Perhaps there is still something to be learned and an innovative solution to be found to resolve this impasse.

From its humble beginnings in Raleigh, the greenway concept has spread within the immediate region and to the other major urban centers within the state. For the past two years a Greenways In North Carolina conference has been held to spread the word further. A recent count identified more than 35 local-government programs in the state.

The greenway concept is so logical and

so attractive that the President's Commission on Americans Outdoors included recommendation for a nationwide network of greenways in its recent report. Nationally, the concept provides an opportunity for large-scale river and wetland protection, as well as the connection of national parks and refuges with population centers. Locally, the concept provides a mechanism for integrating the growing body of knowledge about environmental management with close-to-home recreation opportunities and for improving urban aesthetic and quality of life. A linear process for creating greenways did not exist in the 1970s, yet today many of the institutional underpinnings for greenway programs are in place in state and local governments across the country. Thus a simpler, more straightforward process for creating greenways is now possible, and greenways will continue to spread as long as there are alert and watchful citizens and enlightened public administrators.

NOTE

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BIBLIOGRAPHY

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| <p>Blosser, William. "Park With A City In It," City of Raleigh, 1969.</p> <p>Flournoy, William L. "Capital City Greenway," City of Raleigh, 1972.</p> <p>Flournoy, William L. "Future of the Neuse River," Triangle Land Conservancy and Triangle Greenways Council, 1985.</p> <p>Lewallen, John. "Anne Taylor and the Raleigh Greenway," <i>Sierra Club Bulletin</i>, March 1976.</p> | <p>Morris, Philip. "Streamside Open Space: It's a Natural," <i>Southern Living</i>, Vol. 9, No. 3, March 1974.</p> <p>Rohling, Jane. "Corridors of Green," <i>Wildlife in North Carolina</i>, Vol. 52, No. 5, May 1988.</p> <p>Ross, Roasanne K. "Park With A City In It," <i>American Forests</i>, November 1978.</p> |
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VI. Management

Image-Capture Computer Technology and Aesthetic Regulation in Rural Riverway Planning and Management

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Parkways, greenways, and riverways may indeed be the "way more beautiful." But try to tell that to those who believe that their economic interests are threatened by protection mechanisms proposed for linear corridors. You will soon hear that beauty is subjective, it is in the eye of the beholder, it is purely a matter of individual taste, it cannot be measured, and it is an amenity we cannot afford in the face of whatever the problem of the day may be.

This paper examines the potential roles of image-capture computer technology in communicating visual information pertinent to aesthetic policy development for rivers or other linear systems that traverse rural landscapes. Image-capture technology is a relatively new, relatively low-cost means by which representations (e.g., slides, photographs, or videotape) of the landscape can be digitized, captured by a computer, and modified in realistic ways to depict any manner of change. For example, an existing residential subdivision in one location could be "cut" from one representation and "pasted" into a representation of another area where a proposal for a subdivision is being considered. Furthermore, in a relatively brief time, many manageable attributes of the proposed landscape modification can be readily manipulated—e.g., density, setback, vegetative cutting or replanting, coloration and size of structures, alternative utilities treatments—such that the appearance of the proposed subdivision and subdivision alternatives would be apparent to all.

With leadership from Orland (1986, 1988), Sheppard (1986, 1989), and others, this technology is being adopted by landscape architects and others to augment more

traditional means of producing visual simulations of landscape change, or as an outright replacement of manual and photographic methods. In addition to professional applications, some have discussed the research potential of imaging technology (e.g., Law, 1989; Zube and Simcox, in press; and Zube, *et al.*, 1987). Some investigators have also begun to look at issues of realism and validity, i.e., how human responses elicited by video simulations compare with responses to either the actual environment or other kinds of simulations (Carpman, *et al.*, 1985; Clay, 1986; Vining and Orland, 1988).

BEAUTY, THE LAW, AND RIVERWAYS

Before turning to a discussion of potential roles for video-imaging in the policy arena, it is important to understand that there is an existing legal foundation and framework within which this technology may prove useful. At the federal level, for example, the National Environment Policy Act of 1969 (NEPA) recognizes the assurance of "aesthetically and culturally pleasing" surroundings as a principal purpose of the Act and a responsibility of executive branch agencies both in the management of their own properties and in their regulatory functions. This language is repeated in many states in legislation often referred to as mini-NEPAs.

In Wisconsin, scenic beauty has assumed an importance in the law that to this day serves as a major consideration in many of the state's regulatory functions. In 1952, the State Supreme Court ruled (*Muench v.*

Public Service Commission) that the “right of the citizens of the state to enjoy our navigable streams includes the enjoyment of scenic beauty. It is a legal right that is entitled to all the protection which is given financial rights.” Thus, under the current interpretation of the Public Trust Doctrine, it is the obligation of the state, as trustee for the people, to be concerned with the visual quality of our navigable waters. In Wisconsin, a water is navigable if you can float the smallest kayak on it during the highest spring runoff.

In an important federal case (*Berman v. Parker*), Justice William O. Douglas determined that the concept of the public welfare should be broadly construed and that beauty is a legitimate purpose of legislation in the public interest. Back in Wisconsin, further flesh was added to this legal framework in *Kamrowski v. State*. This case dealt with a legislative program that included the condemnation of scenic easements along the Great River Road in order to provide natural, undeveloped views for motorists driving along sections of the Mississippi River. The targeted parcels would remain in agricultural production, but could not be used for more intensive purposes such as residential or commercial uses. The program was challenged on the basis that “public enjoyment of the scenic beauty of certain land is not a public use of such land.” The court held that “the occupancy [by the public] is visual” and the enjoyment of the beauty of the land constitutes a legitimate public use whether or not the public is even allowed to set foot on the land.

While there is clearly a legal basis for the consideration of aesthetic values, problems arise when attempts are made to implement laws or policies designed to protect those values. Some common cliches reveal the nature of the resistance to aesthetically oriented landscape policies: “Beauty is in the eye of the beholder,” and

“Beauty is purely a matter of personal taste.” From a philosophical perspective, such cliches are insufficiently precise to be regarded as either true or false. From a court’s perspective, however, such arguments may be persuasive: any law or policy that imposes one person’s set tastes on another who legitimately holds a different viewpoint would be regarded as in violation of the due process clause of the Fourteenth Amendment to the U.S. Constitution. Moreover, constitutional law requires that those who are regulated must know, without undue ambiguity, what is expected.

A concrete example might illustrate the reluctance to embrace aesthetic policy; this paper referred earlier to public rights in Wisconsin to enjoy beauty along navigable waters. In 1976, Mr. Wilfred J. Berry sought a permit from the Wisconsin Department of Natural Resources (WDNR) to build a boat slip on the South Fork of the Flambeau River in northern Wisconsin. The only issue was the possible impact on beauty (ecological impacts would be negligible). The WDNR decided to reject the permit application, citing beauty as the reason. Berry challenged the decision and the case was argued before a hearing examiner. Unequipped with the ability to judge aesthetic issues, and not having access to the kind of imaging technology available today, Examiner Joseph P. Schaeve said:

*Beauty is in the eye of the beholder!
So how does one get a handle on such
a nebulous concept as scenic beauty?
How do you test whether something is
pleasing to the eye? If an analogous
situation is determining whether
something is pleasing to the nose, I
note that the Department of Natural
Resources has the following malodor-
ous emission test:*

*An odor shall be deemed objectionable
... when 60% of a random sample of
persons exposed to the odor in their*

place of residence or employment, other than employment at the odor source, claim it to be objectionable and the nature, intensity, frequency, and duration of the odor are considered.

Should we randomly select 10 canoeists, who have canoed past Mr. Berry's lot, to study the application and let 6 of those 10 determine whether the boat slip would be scenically beautiful? How about using the determination of 6 out of 10 of riparian neighbors of Mr. Berry? I think either process would leave the determination wide open for the influence of individual quirks and biases. These processes are just too subjective to pass constitutional muster.

While there are many interesting aspects of this case, several are especially relevant to the discussion here. First, the determination of the outcome of the case occurred without any information on the aesthetic consequences of the proposed boat slip; no information was presented from either an aesthetic assessment technique or from a purely visual description of the proposed environmental modification as might be provided by a simulation. Second, the examiner's decision assumed that if different people saw what the boat slip might look like, they would surely disagree about its aesthetic impact. To the contrary, the preponderance of evidence from the aesthetic assessment literature suggests that such an assumption is not warranted; while canoeists and riparian owners may disagree on whether Mr. Berry should be allowed to build a boat slip, they would most likely agree on the aesthetic consequences of the boat slip. Third, while reluctant to impose the assumed tastes of canoeists on Mr. Berry, he is not reluctant, by virtue of ruling that a permit should be granted, to impose his own tastes

on all of the public, canoeists and riparians alike.

Examples, such as that described above, of the difficulties of addressing aesthetic regulatory matters in riverscapes and other linear systems are abundant. The question is: how might image-processing be used to alleviate these and other kinds of difficulties?

POLICY ROLES FOR IMAGE-PROCESSING TECHNOLOGY

There are at least four kinds of roles that image processing might serve in the context of landscape aesthetic regulatory development, implementation, and evaluation: 1) as a tool for enforcement of the public right to know the aesthetic consequences of environmental modifications, 2) as a source of simulations which might serve as negotiated legal documents in the context of new or existing policies, 3) as a tool to help establish perceptually based performance standards in land use regulation, and 4) as a means of assessing monetary penalties for damages to the beauty of parkways, greenways, and riverways.

THE PUBLIC'S RIGHT TO KNOW

Legally mandated environmental assessments are a product of the fundamental concept that the public has the right to know, within a degree of certitude limited only by the best available knowledge, the consequences of major modifications to the environment. There is no legal reason why the "right to know," so commonly accepted with respect to non-aesthetic environmental issues (e.g., the introduction of toxins), should not extend to aesthetic aspects of environmental issues.

It might be argued that imaging technology can provide the "best available knowledge" regarding the aesthetic

consequences of proposed environmental modification. In the past, it has been possible to assert that providing simulations depicting the appearance of the modified landscape would be too costly and too labor-intensive, yielding only a limited number of perspectives in an unrealistic, coarse-grained way. Such arguments should be regarded as unpersuasive in the face of the power and efficiency of new imaging technologies, particularly with large projects where the overall cost is substantial.

A simple anecdote might be illustrative. The Minnesota Department of Transportation (MDOT) has decided to put another bridge, in addition to the existing one, across the St. Croix River at Stillwater, Minnesota. This section of the river is currently included under the Federal Wild and Scenic Rivers Program. In a draft of the required EIS, the MDOT addressed aesthetic issues associated with the bridge. Accompanied by a pen-and-ink sketch of the type of bridge envisioned, the MDOT assured the public that the bridge would be nice. Pressed by the public for a more definitive idea of what might be meant by "nice" in the context of its location over a federally designated scenic river, the MDOT has so far refused to provide simulations of the sort made possible with video-imaging. Situations such as this seem ripe for legal challenge based on the claim of an inadequate response to the public's right to know about aesthetic impacts using the best available knowledge.

People are now in a position to insist that the best available knowledge, as represented by imaging technology, be utilized in order to allow the public to anticipate the aesthetic consequences of landscape change. Thus, state-of-the-art video simulations could be regarded as an integral part of an implementation strategy to protect aesthetic values as they are expressed in new or existing laws and policies. Requiring by law that such

simulations be provided as a part of environmental assessments is not outside the realm of the possible. Indeed, it seems to be a rather logical step in the evolution of technical means which might be useful in addressing aesthetic issues. A policy initiative requiring that the public be provided a reasonably realistic look at proposed landscape modifications would likely have widespread popular support.

NEGOTIATED LEGAL DOCUMENTS

With the exception of some maps, legal documents are typically written replete with *whereas*'s. Aesthetic-policy issues, obviously, are primarily visual in nature (not to discount auditory and olfactory stimuli). But, based upon recent preliminary discussions with the Public Intervenor's Office of the Wisconsin Department of Justice, there is no inherent reason that legal documents be confined to writing. With that in mind, I would like to create a scenario in which the products of image-capture technology might serve as negotiated legal documents and suggest how such documents may be more palatable to the legal system than assessment procedures that require that aesthetic judgments be made, whether by the public or by experts operating as surrogates for the public.

Imagine now that our Mr. Wilfred J. Berry wishes to put in a boat slip on the Flambeau River. Mr. Berry undeniably has a right to the reasonable enjoyment of his property, including, as a riparian owner, access to the river. The public undeniably has the right to the enjoyment of the beauty along navigable waters in Wisconsin. In the contested case hearing described above, the WDNR was placed in the awkward position of determining whether or not the boat slip would diminish the enjoyment of beauty to the degree that it would be considered an

infringement of the public's rights. To fully establish an evidentiary basis to make such a determination would likely require substantial resources, perhaps a public-evaluation type of aesthetic assessment technique demonstrating consensus. The hearing examiner was placed in a similarly awkward position. Indeed, whether or not the examiner wished to be responsible for making an aesthetic (versus legal) judgment, he had little choice in this particular situation.

By contrast, WDNR field personnel armed with imaging capability might very well sit down with Mr. Berry and negotiate through image manipulation, a visual solution which attempts to balance the rights of the landowner with the rights of the canoeing public. Such a solution may or may not include the construction of a boat slip. Or if it were to be a boat slip, there may be many alternative designs of varying impact on the public's right to the enjoyment of beauty along navigable waters. The negotiated agreement would consist, in part, of a visual simulation which would be regarded as a contract between the State and the riparian owner concerning a future state of affairs.

But suppose that the parties could not agree and consequently wind up in front of Examiner Schaeve. What then? Being provided with a set of visual alternatives, the examiner is in a position to make a legal judgment, rather than an aesthetic judgment *per se*, about which alternative constitutes and *appropriate balance* between the rights of the interested parties.

To carry the scenario one step further, let us suppose that a visual simulation, either negotiated between the agency and the riparian landowner or mediated and imposed by the judicial system, becomes a part of the contract, e.g., a five-year projection about the visual appearance of the property as a set of conditions pursuant to the granting of

a permit. How, five years from now, would one know whether or not such a visually based contract had been breached or not? The judgment now called for is a relatively simple one in a judicial context compared to a judgment about the aesthetic value of a landscape: namely, one must decide whether or not the existing situation, as it came to be after five years, is reasonably similar to the visual conditions depicted in the contract. This is not a particularly difficult type of judgment for people to make, and there is substantial psychophysical literature on the reliability of similarity judgments. Indeed, certain kinds of simple grid overlay systems could be used to quantify degree of similarity.

Portrayed above is only one scenario among many possible. Another potential use for negotiated "visual" legal contracts is in the area of landscape restoration in which aesthetics may be an objective either by choice or by legal mandate (e.g., mining reclamation of sand and gravel operations along rivers). In this instance, contracts might well comprise some indicators of ecological integrity coupled with visual simulations depicting a mutually agreed upon aesthetic outcome of the restoration effort.

There are, of course, many issues to be resolved before the scenarios described above begin to find their way into the aesthetic policy arena. How does the state of our ecological knowledge affect our ability to predict future appearances and within what limits of accuracy, precision, and reliability? And how would such scientific uncertainties be regarded under the law? If we are to be effective in dealing with the aesthetic values of linear systems, the implications and issues surrounding the scenarios described above will have to be explored by environmental designers and planners working with attorneys and representatives of the natural and social sciences.

PERCEPTUALLY BASED PERFORMANCE STANDARDS

People, especially residents of rural areas, are notoriously reluctant to adopt local regulations that might protect the appearance of the landscape from potentially aesthetically unacceptable change. While the reasons for such reluctance go far beyond aesthetic issues alone, this phenomenon might be in part attributable to: 1) the inability of people to picture the aesthetic consequences of possible future changes to local landscapes under existing regulations or a "no regulation" situation, 2) an inability to link the provisions of proposed regulations, which are most often communicated in written form (e.g., "Thou shalt not . . ."), to visual images depicting future aesthetic consequences the provisions may afford or deny, and 3) an historical lack of efficient, cost-effective technical means which would allow proposed regulatory language to be adjusted to preferred, concretely imaged aesthetic outcomes of alternative future landscape change.

The result of the situation is likely to be a series of disputes over the language and provisions of various existing or proposed regulations, reflecting a pro-development versus status-quo dimension. A more productive approach would be to identify the limits of aesthetically unacceptable change based on responses to simulated images of the appearances of future landscapes. Such limits might be used to assist in the drafting of regulatory language that provides for growth and development, but within aesthetic constraints imposed not only by legislative mandates, but by shared, visually concrete expectations and preferences people express for their local landscapes.

Illustrative of this concept is recent legislation in Wisconsin creating the Lower Wisconsin State Riverway. Achieving a

balance between local landowner rights and the clear intention behind the creation of the Riverway to protect the scenic beauty of the area is likely to be an arduous process. The legislation establishes a LWR Riverway Commission comprising local residents and requires that development within the 92.5-mile-long corridor be "visually inconspicuous." To a large degree, the determination of the objective conditions that will be regarded as inconspicuous is left to the Riverway Commission.

At the University of Wisconsin, we are using imaging technology to create "probable" scenarios and "worst case" scenarios through simulations that depict how the river valley might look in the future: 1) with no additional regulations in effect, 2) with varying degrees of projected participation in voluntary programs such as farmland preservation, 3) under existing administrative rules, and most importantly, 4) under various specific provisions the Riverway Commission may adopt in order to make operational the legislatively mandated performance requirement that development be visually inconspicuous. Image processing is ideally suited for a technical assistance function in land use policy deliberations such as that described for the Lower Wisconsin River.

In terms of research, video-imaging is ideally suited to establishing mathematical relations, which can be converted to regulatory language, between small changes to manageable characteristics of the landscape and human reactions to such changes. The work of Gregory Buhyoff and his associates is a good example. They consistently find that such relations are logarithmic; e.g., when damage caused by southern pine beetles exceeds three percent, judgments of visual quality decline markedly (Buhyoff and Leuschner, 1979). Findings such as these have profound implications for landscape management policy. For

instance, a policy concerned with forest aesthetics in which substantial intervention efforts were mandated when pine beetle damage exceeded ten percent would be costly and wholly ineffective from an aesthetic perspective. The reader is left to consider other similar situations, such as fire control on federal lands, where aesthetic matters are to be a part of the overall policy analysis.

AESTHETIC DAMAGES

Despoliation of aesthetic resources in linear corridors and adjacent lands is an everyday occurrence. Even if we became effective in protecting the beauty of many landscapes through planning, design, and policy initiatives, there would still be numerous violations. Unfortunately, economic analyses have not traditionally accounted for unmarked resources such as aesthetics. Kelso (1972) notes that by excluding "nonpecuniaries" (such as aesthetics) from economic trade-off decisions, they have entered the system as though they were free, as if they were "limitlessly abundant and their depletion or deterioration or exhaustion or enhancement for that matter have no value to anybody now or in the future" (Kelso, 1972, p. 11).

The bottom line is that it would be most useful to have policies calling for the assessment of monetary penalties for aesthetic damages. In that regard, image-processing might play a role.

As one example, about two years ago, the City of Lake Geneva, Wisconsin, contacted me about a most interesting problem. A cable television company was refusing to pay its franchise fees for reasons not pertinent to the discussion here. One of the city's legal strategies was to claim that by stringing cable wires along city-owned rights-of-way, the company was causing visual blight in the community. The city

would be willing to let the blight continue if a portion of the franchise fee would be regarded as compensation to the city for the visual blight. In this case, simulations were created showing 1) the effect of underground wire burial in neighborhoods where wires were above ground and 2) the effect of erecting cable wires in new neighborhoods where they had been buried. These simulations were then used in an economic contingent valuation study of home purchase values and their attendant assessed valuation. Differences of \$7,000 in reported willingness to pay were common in neighborhoods with homes in the \$85,000 range.

In a second example, a wealthy landowner in the Lake Tahoe Basin cut down over thirty trees on U.S. Forest Service property in order to improve his view. The Forest Service landscape architect is working with the land appraiser and legal staff to develop a case. It is likely that monetary damages associated with aesthetic values would be higher than that of the replacement cost of the trees alone (e.g., Niemann and Chenoweth, 1985). Computerized simulations of the original views, both from the landowner's property and the pre-cut views associated with travel corridors and the tourism industry, could be used to help establish a dollar value associated with the aesthetic damages.

CONCLUSION

Image processing and other computer developments on the horizon will continue to make it easier to simulate site-specific projects. In addition, however, these technologies can be strategically employed to assist in the policy aspects of linear park development, implementation, and evaluation. The various roles described here probably only scratch the surface of possibilities for this technology.

REFERENCES

- Carpman, J., M. Grant, and D. Simmons. "Hospital Design and Wayfinding: A Video Simulation Study," *Environment and Behavior*, 1985, 17(3): 296-314.
- Chenoweth, R. "Stewards of What?" *Landscape Architecture*, January/February 1986, 132.
- Clay, G. *Assessing the Utility of Computer Video Simulations in Landscape Architecture*. Unpublished Master's Thesis. Department of Landscape Architecture, Urbana-Champaign: University of Illinois, 1986.
- Kelso, M. "Economic Growth, Man's Environment, and Public Policy." M. L. Wilson Lectures. Montana State University, Bozeman, Montana, November 1972.
- Law, C. "Videosimulation: Its Potential as a Research Tool." Unpublished manuscript. Department of Landscape Architecture, Madison: University of Wisconsin, 1989.
- Niemann, B. and R. Chenoweth. "What Price Beauty?" *Landscape Architecture*, 1981, 75(5): 76-77.
- Orland, B. "Image Advantage," *Landscape Architecture*, 1986, 76(1): 58-63.
- Orland, B. "Video Imaging: A Powerful Tool for Visualization and Analysis," *Landscape Architecture*, 1988, 78(4): 78-88.
- Scarfo, R. "Stewardship and the Profession of Landscape Architecture," *Landscape Journal*, 1988, 7(1): 60-68.
- Sheppard, S. "Simulating Changes in the Landscape," *Foundations for Visual Project Analysis*, R. Smardon, J. Palmer, and J. Felleman, Eds., New York: John Wiley and Sons, 1986, 187-199.
- Sheppard S. *Visual Simulation: A User's Guide for Architects, Engineers, and Planners*, New York: Van Nostrand Reinhold, 1989.
- Vining, J. and B. Orland. "The Video Advantage: A Comparison of Two Environmental Presentation Techniques." Unpublished manuscript. Urbana-Champaign: University of Illinois, 1988.
- Zube, E., and D. Simcox. "Landscape Simulation: Review and Potential," *Environmental Simulation: Research and Policy Issues*, R. Marans and D. Stokols, Eds., in press.
- Zube, E., D. Simcox, and C. Law. "Perceptual Landscape Simulations: History and Prospect," *Landscape Journal*, 1987, 6(1): 62-79.

The Abandoned Mines of the New River Gorge: Health and Safety Hazards and Important Cultural Resources

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INTRODUCTION

The New River Gorge National River is an approximately 65,000-acre, 50-mile designated segment of the New River. This area is a steep-sided, narrow gorge and river that winds through the Appalachian Mountains of southern West Virginia. The river and its associated landscapes include some of the most spectacular scenery in the East. Diverse plant and animal life thrives in the gorge, and the entire area is rich with prehistoric and historic cultural resources.

With the arrival of the railroad in the 1870s, the gorge became accessible to large numbers of people for the first time. With the railroad also came a means of getting the area's rich coal resources to market; by 1920 over 25 towns had been established in support of coal mines located in the northern portion of the gorge. Today, coal tipples, coke ovens, foundations, and mine entries are all that remain of this early mining activity.

The extensive past development of the New River Gorge's coal reserves has resulted in significant environmental degradation and numerous potentially severe health and safety hazards throughout the northern two-thirds of the New River Gorge National River. The National Park Service is faced with mitigating the negative impacts of hundreds of hazardous mine openings, coal waste piles, spoil slides, abandoned structures, and hazardous, eroding highwalls (Weesner, 1989).

In 1987, West Virginia University, under a cooperative agreement with the National Park Service, began to inventory and quantify all evidence of past coal and natural gas

extraction in the gorge. Numerous historic records were gathered and knowledgeable agency personnel and citizens interviewed. The area was flown by helicopter, and extensive on-ground surveys were completed. This effort resulted in a comprehensive mine and well site inventory, completed in July 1988.

Figure 1 shows typical mine site conditions found in the gorge east of the town of Thurmond. This graphic illustrates various types of sites that were inventoried (surface mines, older underground mines, and associated structures), the different coal seams, and other landscape features of the gorge.

A geographic information system will be used to integrate these inventory data with other park data so reclamation priorities can be determined and related mine and well site issues can be considered in park planning and operations.

INVENTORY FINDINGS

The most serious potential mining-related health and safety hazards and environmental problems in the gorge are associated with abandoned underground mines. Major potential hazards include open or partially open mine portals (entries), which can be easily entered, and unstable mined-out areas visited by residents or park users. In addition, there are numerous unstable, partially collapsed buildings and other structures (e.g., walls, conveyors, rail, lines, bridges) as well as hazardous equipment and debris.

Significant environmental problems associated with the gorge's underground

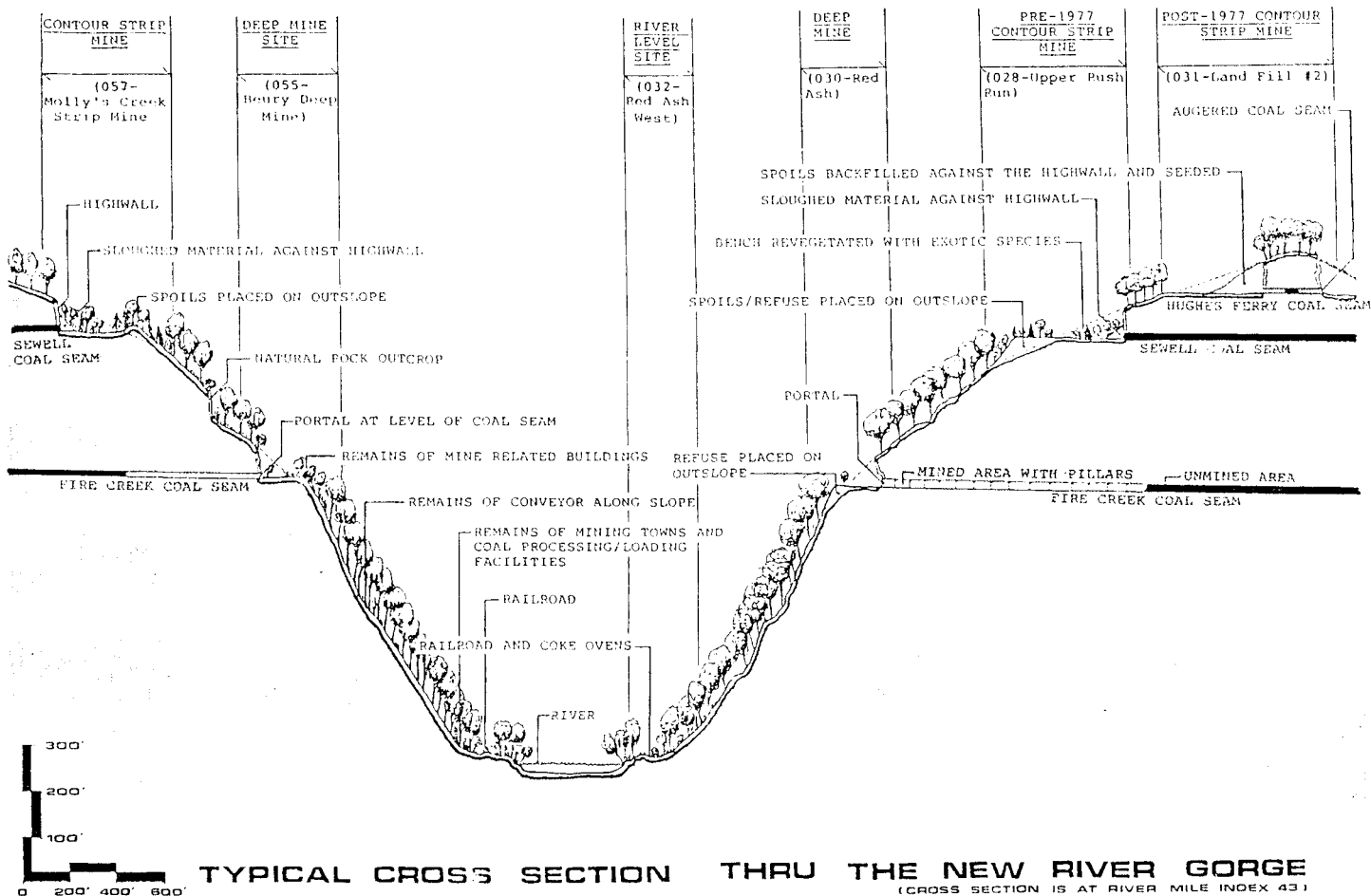


Figure 1. Typical mine site conditions.

mines include mine drainage, which is generally not acidic; subsidence of mine voids that causes depressions in the ground surface; and unvegetated, eroding mine-waste rock and coal refuse areas.

The major deep mine feature is the portal, or entry, which has often sloughed or partially sloughed due to the weathering of unstable rock face material. These portals (most mines include several) are generally at least the height of the coal seam (36 to 72 inches) and may be over 20 feet in width. In addition, at many mine sites there are also tipples, head house, or loadout structure remains (these are structures and equipment for coal cleaning and loading), in addition to typical mine structures such as fan houses, offices, and storage and maintenance buildings.

There is often refuse associated with these deep mine sites, generally on outslope areas below actual mines. This material is usually the result of either mine development or the separation of coal from shale and slate "waste rock." However, most of the refuse from actual coal preparation or mechanical cleaning is found closer to river level, the site of the tipples and preparation facilities. Much of this refuse material is only minimally vegetated, unstable, and lying at or near the angle of repose. As such, it is extremely difficult to reclaim.

The inventory also identified numerous abandoned deep mines that, more specifically, can be characterized as punch mines. Punch mines, which tend to be newer (post-1975) than the larger deep-mine complexes, were generally developed in strip-mined areas to obtain additional coal after strip mining and augering were completed. They also tend to be much smaller, with fewer associated structures and refuse areas, because the coal was often hauled off-site for sorting or cleaning at centralized facilities.

Inventory results revealed that unreclaimed surface mines are also the source

of significant landscape disturbances, with hundreds of acres of unvegetated or partially vegetated bench areas with steep, unstable spoil piles and slides subject to slippage and erosion. Much of this past strip mining was "shoot and shove" contour mining, in which spoil was cast over the outslopes with highwalls left and pioneer vegetation the only source of vegetative cover.

Figure 2 illustrates an unreclaimed contour strip mine with typical site features, including an exposed highwall (often over 80 feet high in many areas of the gorge), spoil piles on the bench, spoil slides on the outslope, small areas of impounded water, and random pioneer vegetative cover. Bench widths vary with the steepness of terrain, so such strip mines are generally much narrower in the northernmost areas of the gorge (often less than 100 feet) than in southern areas where the mines become much wider (over 200 feet) due to the gentler slopes and rounded terrain.

Major associated problems include erosion from highwall, haulroad and spoil areas; rock falls from unstable highwalls; coal and refuse mixed with the spoil (causing possible polluted drainage); and seasonally or permanently impounded areas causing marshy conditions as well as major spoil slips and sloped failures because of saturated soil conditions. Vegetative cover conditions range from mature, well established pioneer vegetation to areas with minimal or no established vegetation.

Strip mining that occurred in the gorge between the late 1960s and early to mid-1970s often resulted in partially reclaimed mine areas. Many of these sites include evidence of some backfilled highwalls, rounded spoil areas, planned water retention ponds or impoundments, and planted exotic and/or native vegetation. These areas tend to exhibit fewer erosion, sedimentation, and slope stability problems than the unreclaimed sites. However, most highwalls were left

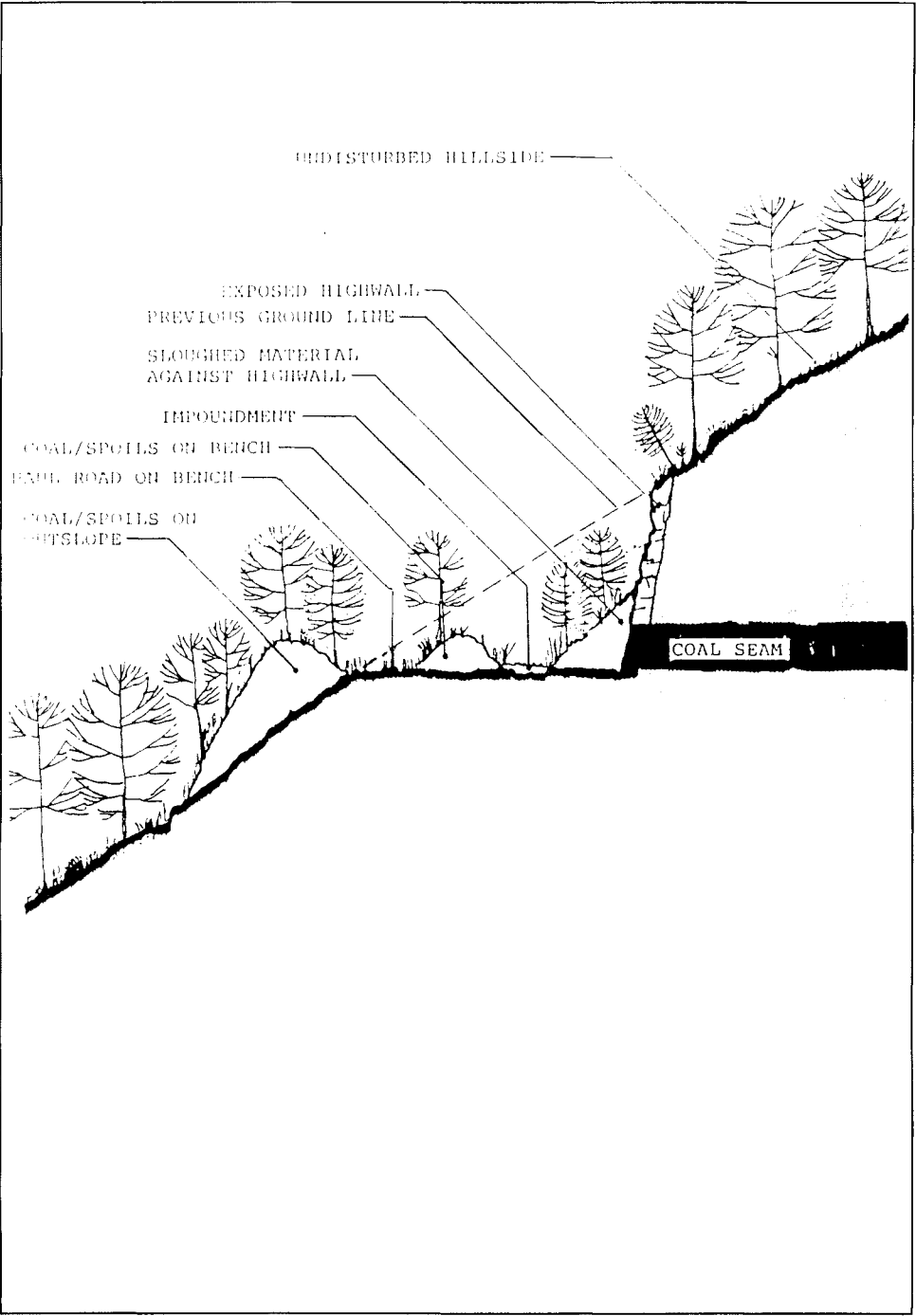


Figure 2. Typical unreclaimed contour strip mining.

either partially graded or completely ungraded and unvegetated.

The gorge also has a number of sites that were apparently more recently mined and reclaimed, since contemporary (post-1976) mining and reclamation standards were applied (Figure 3). These sites generally include complete or nearly complete soil backfilling against the highwall and planted vegetation (often mixtures of grasses, shrubs, and trees). In addition, designed diversions and ponds, as well as stable open haul roads, are present on most sites. Vegetation tends to be well established, with only smaller, isolated unvegetated and unstable areas, which are often located in drainage ways and at the tops of large backfill areas.

The inventory database also included a number of other types of sites and features. Most important among these are river-level coal loading and processing structures, conveyors (that moved the coal between mine and river levels), and coking ovens. These structures were often associated with the old river-level mining towns (e.g., Kaymoor, Nuttallburg, Elverton). In addition, such structures are often among the most visible, accessible, and hazardous features in the gorge and are often visited by fishermen, hikers, and rafters.

Lastly, the inventory included some sites of lesser importance, such as small quarries and natural gas wells. These areas tend to be smaller, with minimal health and safety hazard or environmental problem potentials.

RELATIONSHIP OF MINES TO CULTURAL AND RECREATIONAL RESOURCES IN THE GORGE

The inventory revealed that abandoned mines pose significant health, safety, and environmental problems in the gorge. For example, 93 separate mine sites were found to be the source of significant or moderately

significant health and safety problems. In addition, 41 sites had significant or moderately significant environmental problems, and 31 sites contained major visual eyesores. Only 3 of the 125 sites inventoried contained no health, safety, or environmental problems.

At the same time, many of the inventoried sites offer opportunities for cultural resource preservation, protection, and interpretation as mine and mine town historic sites. With careful planning it will be possible to preserve many of the features and to interpret the significance of these sites for the public. This would be a level of cultural resource protection suitable for a recreational river such as the New River Gorge National River with its mission of focusing on regional cultural resource protection and the provision of wildland recreation opportunities. Recreational use of the sites should be possible without detracting from their historic significance or integrity.

A comprehensive resource planning effort will examine opportunities for interpreting coal mining and coking technology changes, mine town life, and the importance of railroads at specific sites and throughout the gorge. The extent of this past mining, the methods used, and the impacts of mining on the gorge landscapes and the lives of its early residents are known to relatively few people. Nevertheless, this mining history is important in the history of the state and the Appalachian region.

A PLANNING CASE STUDY

The National Park Service is attempting to implement a planning program that explicitly addresses the inventoried mines as health, safety, and environmental problems and as cultural resources. Figure 4 includes a 5,000-acre portion of the gorge north of the historic town of Thurmond, with inventoried mine areas and features (point locations) mapped

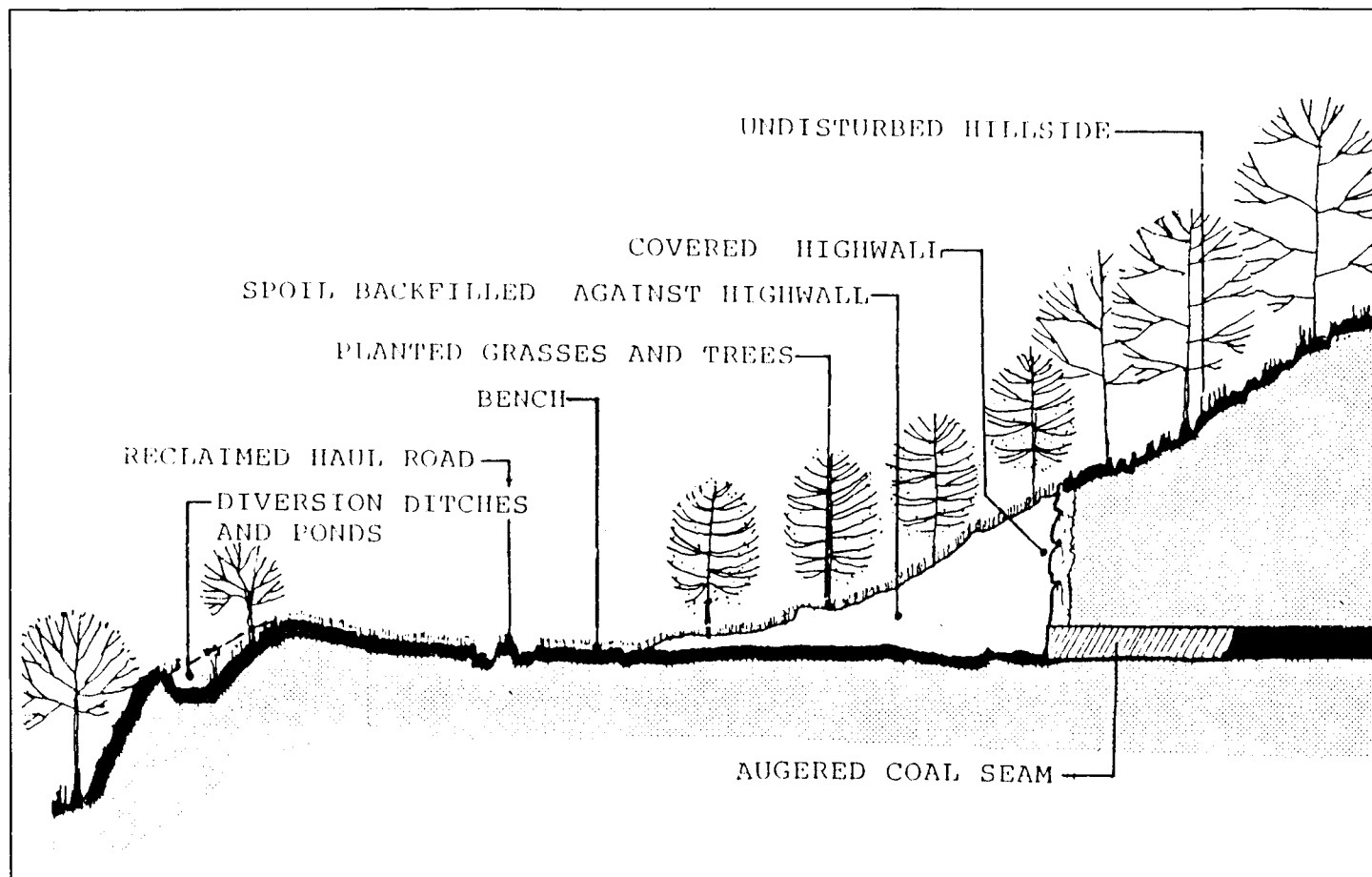
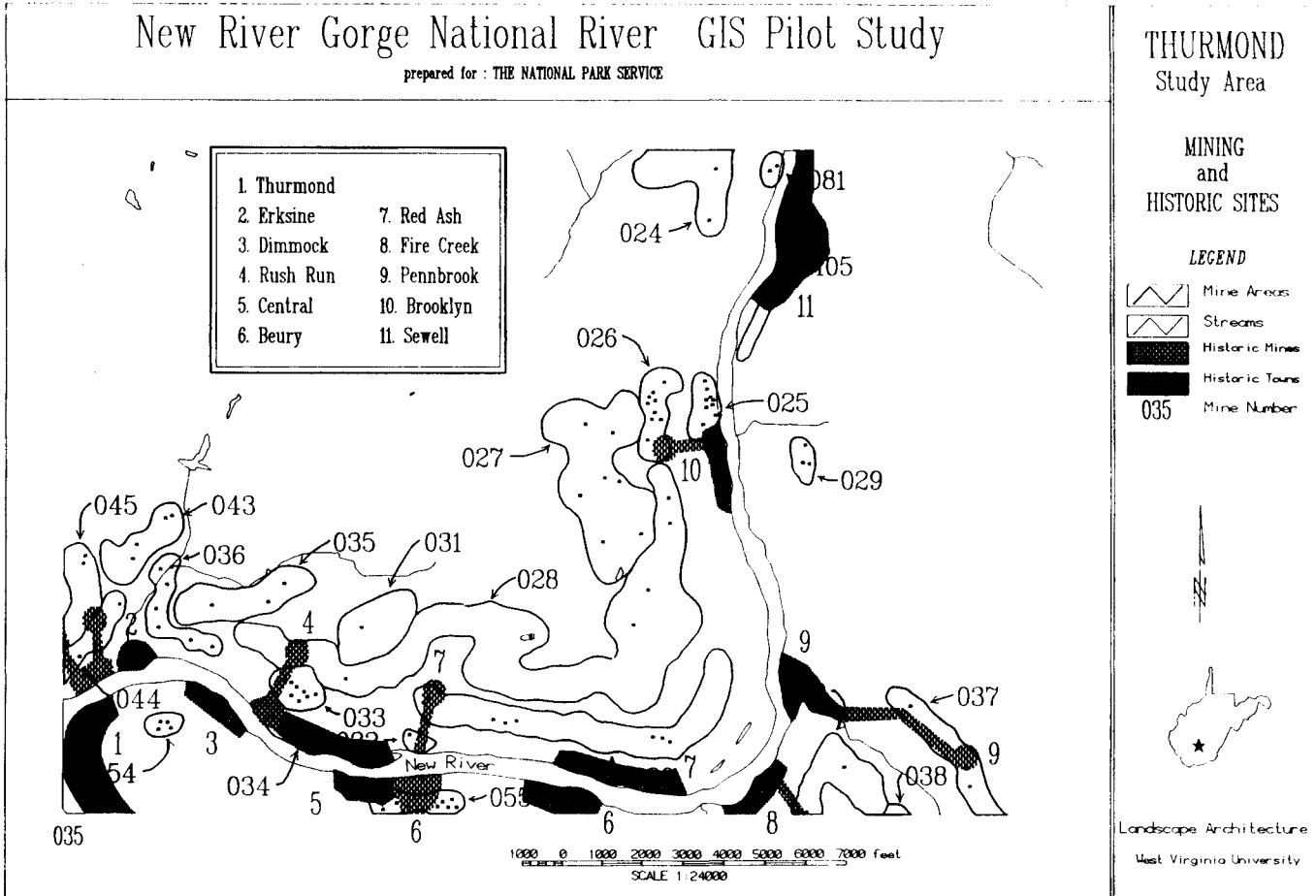


Figure 3. Typical reclaimed contour strip mine.



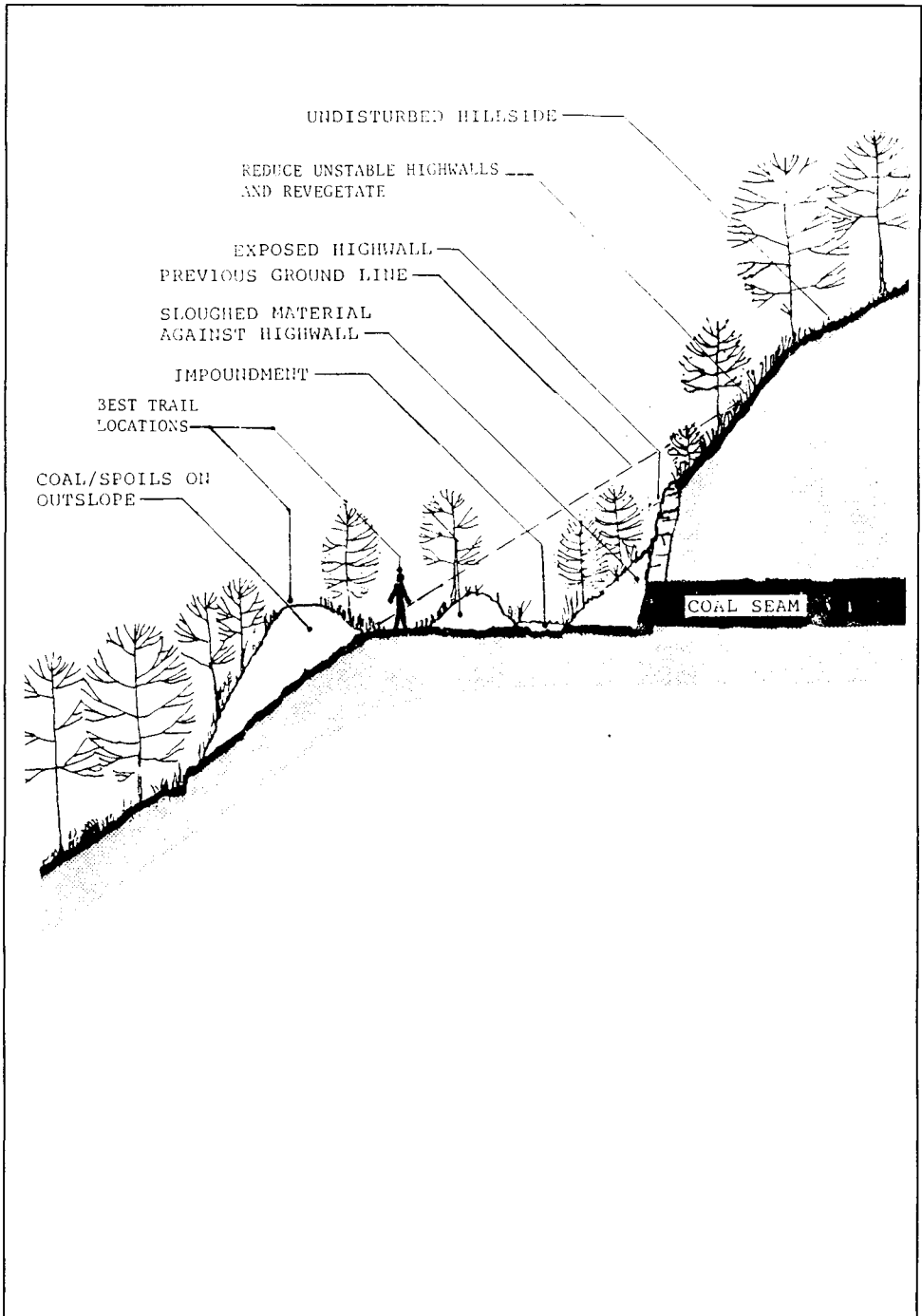


Figure 5. Unreclaimed strip mine developed for trail.

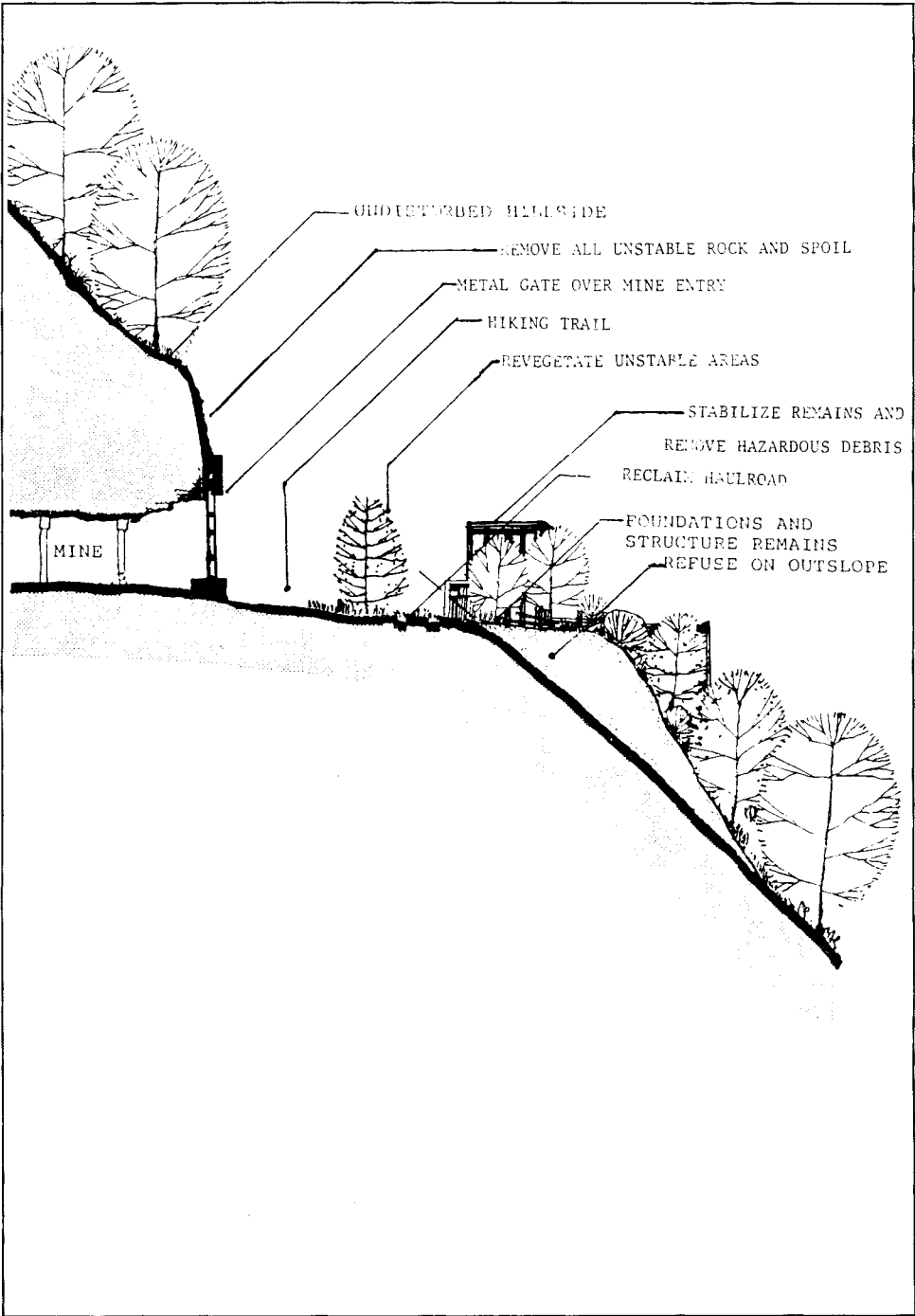


Figure 6. Reclamation for cultural resource protection.

along with historic mine locations and towns. The resulting linear mine benches allowed the planning of a hiking trail adjacent to the river from mine 24 to mine 45 and beyond (Figure 5). Where significant health and safety or environmental problems were found on sites with no important cultural resource values (e.g., mines 35, 36, 43, and the eastern part of 30), traditional reclamation practices that will remove or disassemble any remaining features are being used.

However, sites with health, safety, or

environmental problems (sites 25, 26, 30 west, and 33) but with potentially important cultural resources are being planned so that reclamation and stabilization techniques will allow important site features to remain for interpretation. At the same locations, critical health, safety, and environmental problems will be eliminated (Figure 6). This approach to mine site reclamation and cultural site protection is currently being implemented in the gorge by the National Park Service.

REFERENCES

- Conley, Phil. *History of the West Virginia Coal Industry*. Charleston: Educational Foundation, 1960.
- Skelly and Loy. *Processes, Procedures, and Methods to Control Pollution from Mining Activities*. Harrisburg, Pennsylvania, 1973.
- U.S. Bureau of Mines. Mine Map Repository, Pittsburgh, Pennsylvania.
- U.S. Department of the Interior, Geological Survey, Eastern Environmental Division. Maps of surface mines classified for stability. 1978.
- U.S. Department of the Interior, MSHA, District 4, Mt. Hope, West Virginia. Compilation of prioritized refuse areas based on health and safety problems with sizes, configuration, type, and company.
- Weesner, Margaret. National Park Service. Personal communication, October 1988.
- West Virginia Department of Natural Resources, Bureau of Reclamation. Surface mine permits, valley fills and sediment pond locations.
- West Virginia Department of Natural Resources, Division of Water Quality. Stream and sediment pond samples for active surface mines and refuse dumps.
- West Virginia Department of Energy, Division of Mine Refuse and Dam Control. Data on major active and abandoned refuse piles and impoundments.
- West Virginia Department of Natural Resources, Division of Water Quality. Active refuse area data.
- West Virginia Department of Energy, Division of Planning and Development. "Status Report: Coal Mine Refuse Banks and Associated Impoundments in the State of West Virginia." 1974.
- West Virginia Department of Energy. Active deep mine permits.
- West Virginia Geologic and Economic Survey. Surface mine permit boundaries.

Greenways: Cornucopia of Opportunities

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The greenway concept is growing in popularity across this country and the term "greenway" is becoming a buzz word among resource managers and certain recreational interest groups. Much attention in America seems to focus on two particular types of greenways: abandoned railroad rights-of-way and stream corridors. While these are valuable greenway resources, the greenway concept is by no means limited to these two themes. The cornucopia of benefits to be derived from greenways and opportunities to establish greenways has only begun to be realized.

A GREENWAY BY ANY OTHER NAME . . .

Although greenways may come in many sizes and descriptions, they tend to share certain characteristics. In the simplest terms, greenways can be described as vegetated, linear spaces that often connect and consist of individual units of open space. The basic concept of a greenway is further characterized by terms such as "environmental corridor," "corridor," "linear parks," "flyways," "long distance trails," "pathways through civilization," "linear recreation-ways," and a linear connection between "nodes of interest" or "nodes of diversity."

The length of a greenway may vary from one-quarter of a mile to several thousand miles. A local interpretive nature trail represents one end of the size spectrum for greenways (Leedy and Adams), while the "Greenways for America" concept promotes "fingers of green that reach out, from, around, and through communities all across America," occurring in rural or urban areas (Reilly). Often, a greenway will connect urban and rural areas. A greenway may

emphasize a particular purpose or feature, or it may serve as a multiple-use resource. Greenways may also reflect a "[s]tatewide pattern of resource values" similar to Wisconsin's priorities for linear resource (Lewis).

The list of resources considered in southeastern Wisconsin for designation as an environmental corridor (i.e., a greenway) focuses on key landscape elements including lakes, rivers, streams, floodplains, prairies, woodlands, wetlands, wildlife areas, parks, open space sites, potential parks and open space sites, historic sites, scenic viewpoints, and scientifically significant sites (Rubin and Emmerich, Lewis).

THE CORNUCOPIA

The diversity of forms in which a greenway may exist indicates the variety of potential benefits to be derived, including habitat improvement, expanded outdoor recreation, increased property values, increased business trade, better water quality, and generally improved quality of life. Although a greenway may not be able to accommodate all of these purposes at once, multiple opportunities often occur.

Corridors to and from fragmented habitat areas provide pathways for genetic mixing. Stream corridors, fence rows, and elevated roads provide routes from one natural area to another (Newhouse). In the face of possible boundary shifts among climatic regions, greenway corridors may provide an essential key to maintaining biodiversity. Depending on how quickly the shifts occur, endangered and threatened species otherwise trapped on fragmented nature preserves may migrate and survive. This "mosaic" or "island archipelago"

approach to preserving biotic diversity is being studied in urban and nonurban landscapes to preserve biotic diversity (Rowntree, Dreher and Mariner, Leedy and Adams).

A riparian greenway performs the important environmental function of maintaining water quality by filtering out contaminants in runoff, by maintaining lower water temperatures and thus higher dissolved oxygen content, and by inhibiting bank and soil erosion (New York Department of Environmental Conservation; Rowntree; USDA, 1982). Riparian corridors with natural vegetation intact have also been found to reduce flood damage in downstream reaches and to provide the most productive habitat type (Newhouse; Dreher, *et al.*). Greenways along streams also provide a buffer between the stream and potentially degrading land use practices (Roseboom, *et al.*). The designation of environmental corridors in Wisconsin is used to indicate areas unsuitable for development of water treatment facilities and other activities that may degrade water quality. A similar approach in Washington state identifies environmentally sensitive areas, including stream corridors (Jennings).

The vegetation in greenways may perform basic environmental enhancements in addition to hydrologic and habitat functions. Trees and other vegetation mitigate urban heat islands through a moisture/cooling regime. Research on the air-conditioning abilities of trees in developed areas indicates that a community can reduce residential air-conditioning demand on a hot summer day by 10 to 15 percent (Rowntree, 1986a). Trees also block cold winds in the winter, reducing energy consumption for heating. In addition, a tree is estimated to absorb 13 pounds of carbon dioxide a year (2.6 tons per acre) in the process of producing oxygen. Due to their effect on energy consumption, urban trees are considered fifteen times as effective in the mitigation of carbon dioxide

emissions as are rural trees. In addition, when properly planted along roadways, trees and shrubs act as a natural snow fence (USDA, 1982). Trees also absorb city or highway sounds (Rowntree, 1986b).

Greenways provide an opportunity to directly improve human welfare, particularly in urban areas where greenery can mitigate the stresses of concrete and crowds. Numerous studies indicate substantial increases in healing rates by patients with a view of natural greenery over those patients without such a view (Rowntree, 1986b). Roger Ulrich, a researcher at Texas A&M, has conducted extensive monitoring of human response to views of trees and other greenery. A significant reduction in blood pressure and other body signs occurs when going from a sterile man-made scene to a green scene.

An interesting trend in the studies cited above is that a savanna-type landscape appears to provide the greatest feeling of security in research participants. Possible explanation for this response is the similarity of the traditional savanna park landscape to the environment in which humans are believed to have evolved (Schroeder). Another interesting finding is a significant increase in the appeal of a landscape that includes water. People seem to be drawn to water, whether it is a fountain, stream, lake shore, or pond. Kaplan's research indicates a preference for the sense of order provided by linear features in the landscape as well as, paradoxically, a certain level of mystery as to where the linear feature leads.

Physical health benefits are derived from greenways since they are ideally suited for linear-based recreation such as biking, hiking, and canoeing. Use of the North Branch Bicycle Trail in Chicago, for example, easily exceeds 3,000 cyclists on a summer day, with approximately 500 per hour during peak afternoon hours. According to the same survey, 17 percent of the users said they

would not ride a bike at all if the trail was not there (Gobster). A visitor survey by the U.S. Forest Service revealed that virtually the entire country's population participates in linear-based outdoor recreational activities one or more times annually. At least 41.3 percent walk for pleasure, 23.8 percent day hike, 10.4 percent backpack, 13.9 percent canoe or kayak, 6.5 percent cross-country ski, and almost 50 percent do some sort of fishing.

Greenways provide a unique educational resource and may serve as outdoor labs for school field trips as well as sites for more general interpretation. The linkage of natural, historic, and recreational resources in many greenways and the sequential occurrence of points of interest can invite interactive learning, increasing student interest and retention of information.

The inherent ability of greenways to mitigate several environmental concerns while at the same time providing recreational and educational opportunities to the public on small acreages makes greenways a bargain. In contrast to rectangular preserves, greenways provide long-distance, high-quality open spaces by using narrow strips of land that connect existing resources, thereby increasing the value of the individual pieces of land. A greenway easement may be established that provides public access while still allowing the landowner virtually total use of the property. Quite often, the strip of land to be set aside as a greenway has not been actively used by the landowner. Studies reviewed by Stevens in property value with increased distance from a greenbelt but sometimes depressed property values immediately next to an actively used area.

COMPETITION FOR THE CORNUCOPIA

A vital feature of a recreational greenway is

access. Community access generates support for a greenway. Once people are involved with a resource, greater understanding can result. The paradox is that the access to and use of a greenway can both win support and lead to conflicts among users while even degrading the environmental values that originally drew people there.

Any piece of land open to public access holds a potential for user conflicts. Greenway corridors contain multiple resources and may draw support from many individual interest groups. Several proponents may support the existence of a particular greenway but have different visions of the appropriate management of the resource. In addition, it is likely that a greenway will usually lie in the jurisdiction of more than one governmental unit. The result is a shift of focus from protecting greenway resources to protecting individual claims (Partners in Conservation).

In their discussion of "greenlining," Hirner and Mertes recognize citizen input into zoning decisions as a "key means of land protection where each parcel can be tied together through a common thread . . ." Conflicts may be overcome by the establishment of a commission or board of representatives from the various interests. A possible outcome may be designated uses for different areas of a greenway through consensus. Proponents of greenways must seek a consensus and make their interests known to decision-makers. Through such a multiple-purpose approach, a synergy of interests may be facilitated in place of conflicts and fragmented efforts.

TO BUILD A GREENWAY

Two general approaches may be followed to establish a greenway. One way is simply to buy a linear piece of land. The other is to weave pieces together using conceptual techniques. A key to any greenway development is linkage.

There are limited opportunities in the United States today to buy or designate large acreages of linear land parcels for greenways. The abandonment of railroad rights-of-way provide the most prominent opportunity of this kind. As over 3,000 miles of railroad are abandoned each year in the United States, a one-time opportunity exists to establish long-distance greenways.

Other human-made linear features, such as canals, offer a unique opportunity for greenway development similar to a railroad corridor. The Illinois-Michigan (I&M) Canal, for example, stretches across more than 100 miles of northeastern Illinois. The canal was constructed by the state between 1836 and 1848 to provide a shipping link between Lake Michigan and the Mississippi River via the Illinois River. The canal was used until 1933, when it was replaced by another canal that could accommodate larger vessels. The I&M Canal has been developed into a 61-mile hiking-biking trail through a partnership between the state and federal government with local interests. In some sections, the corridor includes state and local parks and preserves.

LINKAGE, LINKAGE, LINKAGE

A much more common approach to greenway developments today involves a large-scale version of "connect the dots," in which a greenway is superimposed on existing features through various linkages. Coordination of various individual and local projects increases the efficiency of greenway development. It is important to remember that greenways come in many sizes and that small greenways can grow. Through land-banking, promising parcels of land can be purchased for future integration into a greenway or in trade for other linear park lands.

Greenway development should be linked with other issues, events, and programs.

Business interests, community groups and programs, outdoor events, environmental concerns, social issues, and economic issues can provide a base of support for greenway projects. For example, the Upper Illinois Valley Association (UIVA) was established in 1982 by 19 business and industry leaders in the Illinois and Michigan National Heritage Corridor. The UIVA has made historic interpretation integral to developments in the corridor (Winstel), and the association co-sponsors workshops in various areas along the I&M corridor to provide technical assistance to interested parties. Strategies to avoid negative impacts on the corridor include revised zoning ordinances and subdivision regulations (Camerios).

Existing community projects, such as street tree programs, are not often recognized for the potential greenway benefits they could provide. A great opportunity exists to integrate greenway concepts into community tree-planting and maintenance programs through the selection and placement of species for color variety, wildlife habitat, energy conservation, and hardiness (Shien).

In addition to energy savings, increased property values, and environmental mitigation, greenways provide economic benefits through increased tourism and recreation. Once greenway planning in Illinois was tied to the state's five-year economic development strategy, funding for greenway development became more available. Greenways are promoted in the Illinois State Recreation and Tourism Plans to increase tourism income. Recognition of potential greenway benefits has won state grants for projects at Rock Island, Fox River, and other corridor-oriented projects in the state.

In addition to financial and voluntary incentives, regulatory provisions affect greenway development. A review of Illinois state statutes, for example, indicates that local governments can play an active role in

supporting greenway development. Legislation creating Forest Preserve Districts in Illinois specifically facilitates acquisition of linear park land parcels. Special provisions are made for extension of park district lands bordering on public waters to the other side or along those waters. In addition to general land use authorities and responsibilities, the Water Supply, Drainage, and Flood Control Act (P.A. 81-1509) assigns local government the responsibility for stream corridor greenways, floodplains, and stream pollution control.

A key recommendation of the President's Commission on Americans Outdoors was the development of "green places for outdoor recreation and conservation close to home" for Americans living in urban areas (Reilly). Greenways certainly can provide these opportunities for both urban and rural residents. Greenways also present cost-effective opportunities to preserve and improve environmental quality. The cornucopia of opportunities to establish greenways and to realize their simultaneous social and environmental benefits is indeed bountiful.

BIBLIOGRAPHY

- Adelmann, Gerald W. "A Preservation History of the Illinois and Michigan Canal Corridor." *The Illinois and Michigan Canal National Heritage Corridor, A Guide to Its History and Sources*. Eds. Michael P. Conzen and Kay J. Carr. Northern Illinois University Press, 1988, pp. 43-52.
- Camerios, Ltd. "An Historic Canal Town Wakes Up To Its Future." Brochure, Fall 1987.
- Dreher, Dennis W., Richard D. Mariner, and Constance Hunt. *Technical Report: Stream and Wetland Protection—A Natural Resource Management Priority in Northeastern Illinois*. Chicago: Northeastern Illinois Planning Commission, 1987.
- Gobster, Paul H. "Urban Bicycle Trails: Use Patterns and User Preferences." *Trends*, 1988, 25(3):21-25.
- Hirner, Deirdre K., and James D. Mertes. "Greenlining: Countryside Parks Come of Age in the United States." *Renewable Resources Journal*, Winter 1988, pp. 17-20.
- Jennings, Michael D., John P. Reganold. "Policy and Reality of Environmentally Sensitive Areas in Whitman County, Washington, D.C." *Environmental Management*, 12(3):369-380.
- Kaplan, Rachel. "Down by the Riverside: Informational Factors in Waterscape Preference." *Proceedings: River Recreation Management and Research Symposium*. Minneapolis: January 1977, pp. 285-289.
- Keiner, Suellen T. *The Contribution of Outdoor Recreation to State Economic Development*. Council of State Planning Agencies, 1985.
- Leedy, Daniel L., and Lowell W. Adams. *A Guide to Urban Wildlife Management*. Maryland: National Institute for Urban Wildlife Studies, 1984.
- Lewis, Philip H. "Quality Corridors for Wisconsin." *Landscape Architecture*, 54(64):3-5.
- Newhouse, David A., Great Lakes Regional Vice-President, National Audubon Society. Personal contact, July 1988.
- New York State Department of Environmental Conservation. *Stream Corridor Management: A Basic Reference Manual*. Albany, January 1986.
- Partners in Conservation. *Corridors Working Group Report*. June 3, 1987.
- Reilly, William K., ed. *The Report of the President's Commission on Americans Outdoors: The Legacy, the Challenge*. Washington, D.C.: Island Press, 1987.

- Rowntree, Rowan A. "Ecological Values of the Urban Forest." A. F. Phillips and D. J. Gangloff, compilers. *Proceedings of the Third National Urban Forestry Conference*. December 7-11, 1986a. American Forestry Association.
- Rowntree, Rowan A. "Ecology of the Urban Forest—Introduction to Part II." *Urban Ecology*, 9(1986):229-243.
- Rubin, Bruce P., and Gerald H. Emmerich, Jr. "Refining the Delineation of Environmental Corridors in Southeastern Wisconsin." *Technical Record*, 4(1981):1-22.
- Schien, Richard. "Resolving City Tree Issues and Conflicts." International Society of Arboriculture 65th Annual Conference, St. Charles, Illinois, August 1989.
- Schroeder, Herbert W. "Perceived Quality of Urban Parks and Forests." *Trends*, 1988, 25(3):18-20.
- Stevens, Thomas. "The Economic Benefits and Cost of Urban Parks: An Overview." *Trends*, p. 32.
- USDA Forest Service. *National Forest Landscape Management, Vol. I. Agriculture Handbook No. 434*, 1973.
- USDA Forest Service. *Windbreaks for Illinois*. Windbreak Information Note No. 2. Forestry 190-16-16, September 1982.
- Winstel, Jeffery F., Upper Illinois River Association. Telephone interview, April 10, 1989.

Visibility Description, Visual Analysis, and Land Use Control Along Rural Scenic Byways: A Case Study in the Appalachian Mountains of Virginia and West Virginia

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INTRODUCTION

A scenic byway is a rural country road that traverses areas having outstanding aesthetic, cultural, historic, or interpretive value. The landscape through which the byway passes provides the visual corridor for the roadway. This scenic corridor is generally of greater extent than the adjacent roadside areas and includes middleground and distance views. The entire scenic corridor is of great importance as it provides the visual resources for the byway.

The protection and management of the visible corridor along these byways is essential for the continued enjoyment of the scenic resource (Levin, 1988). The scenic quality of these corridors often deteriorates as land use patterns change. New uses, often

out of scale and in the wrong location, do not seem to fit the landscape as well as older use patterns. Country roads that once provided superb views and vistas over rural landscapes now provide views of driveways and front yards of residential strip development (Doherty, 1984). This phenomenon has become so commonplace that we often accept it as the inevitable consequence of suburban country living (Blake, 1964). As a result, we often assume that the quality of the visual experience along our country byways will decrease as the level of suburban development increases (Strokes, *et al.*, 1988).

To counter this argument, planning and design studies are underway in the Landscape Architecture Program at Virginia Polytechnic Institute and State University to demonstrate

that visual quality can be maintained (or even increased) as the level of rural development increases. Scenic byways can be enhanced through knowledge of the character and quality of the corridor, through understanding of the travelers' experience within that corridor, and by careful attention to the planning and design of new uses in the landscape.

Scenic corridor management studies have been undertaken on country roads in the mountains of Virginia and West Virginia. A number of analytic tools useful in recognition and description of scenic resources have been developed along with methods of implementing design criteria. Scenic corridor plans, design guidelines, and performance standards are recommended to implement scenic resource policies and byway plans. These studies suggest that the physical planning of scenic corridors complements land use planning as exercised by many local communities in the region.

The purpose of this paper is threefold: 1) to suggest an approach to the planning and design of scenic byway corridors which draws upon the methods of visual analysis developed along country roads in the mountains of Virginia and West Virginia; 2) to outline broadly a framework for a scenic byway plan, scenic resource management system, and site plan review process appropriate for localities in these rural regions; and 3) to describe a number of scenic inventory and evaluation methods developed and tested along these country roads.

AN APPROACH TO SCENIC BYWAY PLANNING AND DESIGN

Planning for a scenic byway and its scenic corridor is primarily concerned with the physical arrangement of land uses, the impact of land uses upon the landscape, especially their visual impact, and their relation to the

byway and its foreground corridor. While similar to land use planning, scenic byway planning is not principally concerned with the types of land use or their relation to other community infrastructure. Aesthetic and environmental character, rather than land use type, is the criterion for corridor protection, enhancement, and management.

Scenic byway planning consists of five conceptually distinct phases as outlined in Figure 1. Planning and design criteria can be implemented by a site plan review process only if an appropriate policy and regulatory structure exists in the local community.

DEVELOPMENT OF A SCENIC BYWAY PLAN

The following discussion outlines the five steps in scenic byway planning. Each phase is interrelated with all others, and the sequence is often varied in response to particular situations, opportunities, or requirements. Interaction among phases and tasks within phases should be frequent. Plan formulation or implementation often indicates the need for additional information or review of earlier considerations that may alter the final concept.

Public initiative and response are key ingredients in all phases of this process. The public includes residents, landowners, elected officials, interest groups, and, of course, the motoring visitor.

IDENTIFY POTENTIALS AND DEFINE GOALS AND OBJECTIVES

Defining the full range of aesthetic and environmental opportunities afforded by an existing country road often involves an initial assessment by a landscape architect or land planner. Residents who frequent the road may have a good sense of the charm and beauty of the landscape, but some pre-assessment is usually required to determine

Figure 1. Scenic Byway Planning Process

1. Identify Potentials. Define Goals and Objectives.

Pre-assessment of scenic and environmental potential.
Community participation in setting goals and objectives.

2. Inventory, Analysis, and Resource Assessment.

Current land use.
Community considerations.
Aesthetic considerations.
Environmental considerations.

3. Master Plan for Scenic Byway and Corridor.

To express the goals, objectives, and policies.
To serve as a guide to decision-making.
Realistic goals for growth and change over time.
Aesthetic and environmental concerns.
Opportunities for views, vistas, pullouts, etc.

4. Scenic Resource Management System.

A set of design guidelines.
A set of performance standards.
A scenic corridor plan.

5. Site Plan Review Process.

Establishment of procedure for review.
Relation to master plan.
Design criteria.
Standards.
Enforcement.

the potential of the road and its corridor.

The initiation and development of goals and objectives for a scenic byway and its corridor usually are community-based activities. Opinions, views, and concerns of local residents and landowners who would be affected must be taken into account. Issues must be aired through discussions, public meetings, and interviews with interested parties. To be successful, any scenic byway project must have the support of local community leaders, residents, and civic organizations.

INVENTORY, ANALYSIS, AND RESOURCE ASSESSMENT

The initial resource assessment will lay the groundwork for the development of a scenic byway plan. The assessment begins with an inventory of the visible corridor, or viewshed, followed by evaluation of views and the sequence of views from the scenic byway. The study would also typically include data collection, mapping, analysis, and evaluation of the aesthetic, environmental resource, current land use, and legal/institutional framework within the byway corridor. Because of the detailed nature of scenic concerns, much of the corridor should be mapped and analyzed at a larger scale (1:6,000 or greater) and will probably require field traverses along portions of the roadway alignment. Resource assessment typically requires a team of specialists working together under the direction of a landscape architect and/or land planner.

Aesthetic considerations can be assessed through a number of different inventory approaches and analytic techniques, such as visibility diagrams; visual zone mapping; inventory of significant historic, cultural, and natural features; foreground analysis; and spatial sequence analysis. Several of these methods will be described later in this paper.

Environmental considerations can be assessed through the inventory, mapping,

and analysis of important natural features or landscape elements at appropriate scales and detail. Outstanding natural features or scenic resource areas would be of special interest and should be mapped separately. Any unique, sensitive, or threatened resource should be fully investigated to assure proper planning and management consideration. Of particular concern would be the appraisal of rock, soil, slope, and water conditions if performance standards are to be developed.

Current land use can be surveyed and mapped in accord with a land use classification system appropriate to the region. More detailed data and information may be required for certain uses if performance standards are to be written for aesthetic or environmental resources (Duersken, 1986).

Community considerations should be surveyed and documented through interviews, meetings, and workshops to determine issues and concerns that may influence people and land use along the byway. Questions regarding scenic corridor planning, land use issues, design guidelines, and local regulation can be addressed with individuals, groups, and communities along the route or in workshops.

The overall intent of scenic byway planning and design should be thoroughly discussed with affected parties, groups, and local communities. The result of this work would be to formulate overall corridor concepts and planning and design criteria for the scenic corridor along the byway.

MASTER PLAN FOR SCENIC BYWAYS AND CORRIDORS

We envision a master plan for a scenic byway as a set of planning and design policies together with a plan that shows the existing alignment of the byway and its scenic corridor. This master plan should serve as an aesthetic design guide to new development within that scenic corridor.

The plan's first function would be to

express the goals, objectives, and policies of the entity created to develop the scenic byway. In most cases such an entity would be the local communities along the byway. The second function would be to serve as a guide to decision-making for residents and local property owners. To be successful such a plan should be a statement of what most affected residents and communities want—what goals, values, and ambitions they strive for. In many localities it should balance the wealth of scenic and environmental resource against the need for employment, economic growth, and change in land use.

Scenic byway plans should reflect realistic goals for growth and change over an extended period of time. However, any plan should not be static. It should instead be subject to periodic review for update and change. The byway plan should be comprehensive in its coverage and consistent in policy over the full extent of the parkway corridor. All individuals and communities within the corridor should be subject to the same set of policies and treated with fairness and equality. The rules and regulations for implementing the plan must be clearly stated and understood.

The plan should contain a set of policies to direct the quantity, character, and rate of growth within the corridor and indicate how these considerations are to be achieved. The plan should be both graphic and written, containing narrative sections to describe important aspects of policy more fully. We believe that graphic plan elements are easily understood by most people. For this reason, we would map scenic corridor setbacks, buffers, areas of screening, etc., so that individuals could better understand the development potentials of a piece of property along with the considerations for scenic quality.

Such a byway plan need not specify land use but could indicate preferred locations for certain community uses or facilities. It should also indicate opportunities for scenic

views, vistas, and other resource amenities. At the same time it should indicate scenic areas or land use situations that pose problems or need to be corrected. We believe that design guidelines afford the best opportunity to illustrate and guide appropriate development. They provide a vision of what could be, and for that reason they are an important element of any plan.

Certain land uses or activities should be subject to standards that specify a level of performance that can be measured to determine compliance with the policies of the plan. Such performance standards need to be developed in accord with specific regulations and permitting procedures created to implement the byway plan.

Scenic outdoor corridor plans, design guidelines, and performance standards are recommended to implement scenic resource policies and plans. These tools, if systematically applied, can provide both valuable information and a strong design framework for the planner and manager of rural scenic byways.

SCENIC RESOURCE MANAGEMENT SYSTEM

Establishment of a scenic resource management system depends upon an adopted byway plan and set of policies and guidelines to implement that plan. The use of various controls as tools to implement plans has been carried out in this country for over 60 years. This traditional approach is generally viewed as a legitimate exercise of the so-called police powers reserved by individual states.

We envision the adoption of a scenic byway plan as the policy framework for all subsequent actions. The scenic resource management system, as outlined below and in Figure 1, would be composed of three interrelated elements: 1) a set of design guidelines, 2) a set of performance standards, and 3) a scenic corridor plan.

Design Guidelines

Design guidelines provide ideas for site planning and the design of structures, improvements, and activities within the scenic corridor. They are not a regulation which dictates a specific design solution for a given level of performance. Instead, these guidelines provide a vision and design flexibility. Design guidelines also provide the opportunity to illustrate graphically certain planning and design concepts appropriate to specific situations or specific localities.

The guidelines should be developed in graphic and textual format to serve as a guide for use by property owners, public officials, and civic leaders. The following list of items may be appropriate for inclusion in a typical manual of design guidelines for rural regions in Appalachia:

- **Signage along roadway.** Commercial, directional, or informational signage guidelines are extremely important for the image of the byway and scenic corridor; they may require a separate section in the guidelines.
- **Parking.** Examples of possible parking and driveway layouts for different types of land use should be provided; they could address the loading and unloading of commercial vehicles in or adjacent to the byway, and the storage of automobiles.
- **Screening.** Include examples of possible approaches to screening for different land uses and facilities; examples of both natural (vegetation and landforms) and structural screens (fences, buildings, and walls) together with suggestions for materials are recommended.
- **Building facades.** Guidelines should cover architectural control in selected situations, such as historic restoration or new commercial developments or visually sensitive areas along byway.

- **Open space corridors.** Techniques and examples should be included for the preservation of open spaces along the byway or in other areas; cluster concepts or transfer of development rights may be described.
- **Clustering of building masses.** Provide examples of possible planning ideas and design solutions in appropriate situations along the byway.
- Include other elements as needed.

Performance Controls

Performance controls are standards that are written appropriate to the locality and to the need for or level of control desired. These controls establish minimum requirements, but not necessarily optimum standards. A performance standard is a regulation that specifies a level of performance that is measured to determine compliance. Implementation of performance standards requires a strong regulatory framework and a high level of technical expertise.

The following is a list of possible controls appropriate to scenic byways:

- **Signage.** Size, location, height, and other requirements of all signage within corridor.
- **Parking.** Size, number of spaces, and locational criteria for parking areas for a range of different uses and/or activities; also specifications of loading and unloading areas; proximity to the scenic corridor; and provisions for abandoned or vacated automobiles.
- **Erosion and sediment.** Specific measures to protect and conserve soil and vegetation from erosion and sedimentation; specific measures to protect watercourses and waterbodies; control measures for stormwater runoff and for water quality.

- **Noise.** Specific standards to protect byway users and adjacent property owners from excessive noise, especially at unreasonable hours.
- **Dust, fumes, odor.** Specific measures, as necessary, to protect people and environment from emissions that could be injurious to health or detrimental to the full use and enjoyment of the byway and adjacent properties.
- **Wastewater and septic systems.** Specific measures to protect the public health, soil, and waters of region from health hazards caused by untreated wastewater or malfunctioning septic systems.
- **Refuse disposal.** Specific measures to dispose of all refuse in timely manner and in such a way that storage of material is not visible from byway.
- **Glare.** Measures and standards to protect scenic corridor and adjacent properties from glare of materials, colors, etc.
- **Lighting.** Measures and standards to control night lighting by type, location, and height.
- Other standards as necessary.

Scenic Corridor Plan

The scenic corridor plan is a graphic plan that notes the limitations and opportunities for the siting of structures, improvements, and activities on private property along the scenic corridor. This site plan controls the location of land uses relative to selected scenic resources of the byway, as noted in the resource assessment. However, the corridor site plan would not stand alone but would require support from performance standards and design guidelines.

For example, the following planning elements could be illustrated on such a plan,

as shown in Figures 2 and 3.

- **Setbacks.** Generally along edges of property, especially setback from byway; setbacks can be variable.
- **Buffers.** Variable setback along byway and in other areas within a parcel; use of buffers to protect both scenic corridor and land uses.
- **Access control.** Limited driveway or road access zones along edge of byway.
- **Special screening.** Landform, vegetative, and/or structural screening for land uses or for scenic purposes.
- **Building envelopes.** Areas within a property that contain structures and buildings; the purpose is to lessen impacts on scenic corridor.
- **Other elements as needed.**

SITE PLAN REVIEW

Site plan review is the process used by local governments to implement the provisions and requirements of the scenic byway plan as set forth in the scenic resource management system. This process would be activated through a permitting procedure by property owners within the scenic corridor of the byway.

Site plan review should be enacted as an ordinance (local code) under authority delegated through enabling legislation for planning and zoning. Most site plan or design review ordinances are based upon the state's power to control or regulate land development so as to promote the public health, safety, and welfare. These so-called police powers rest with the state legislature but can be delegated to local governments, authorities, boards, and commissions. Local controls, such as land use ordinances, must usually specify purposes relative to the goals and objectives of approved land use policies and plans. These adopted plans must

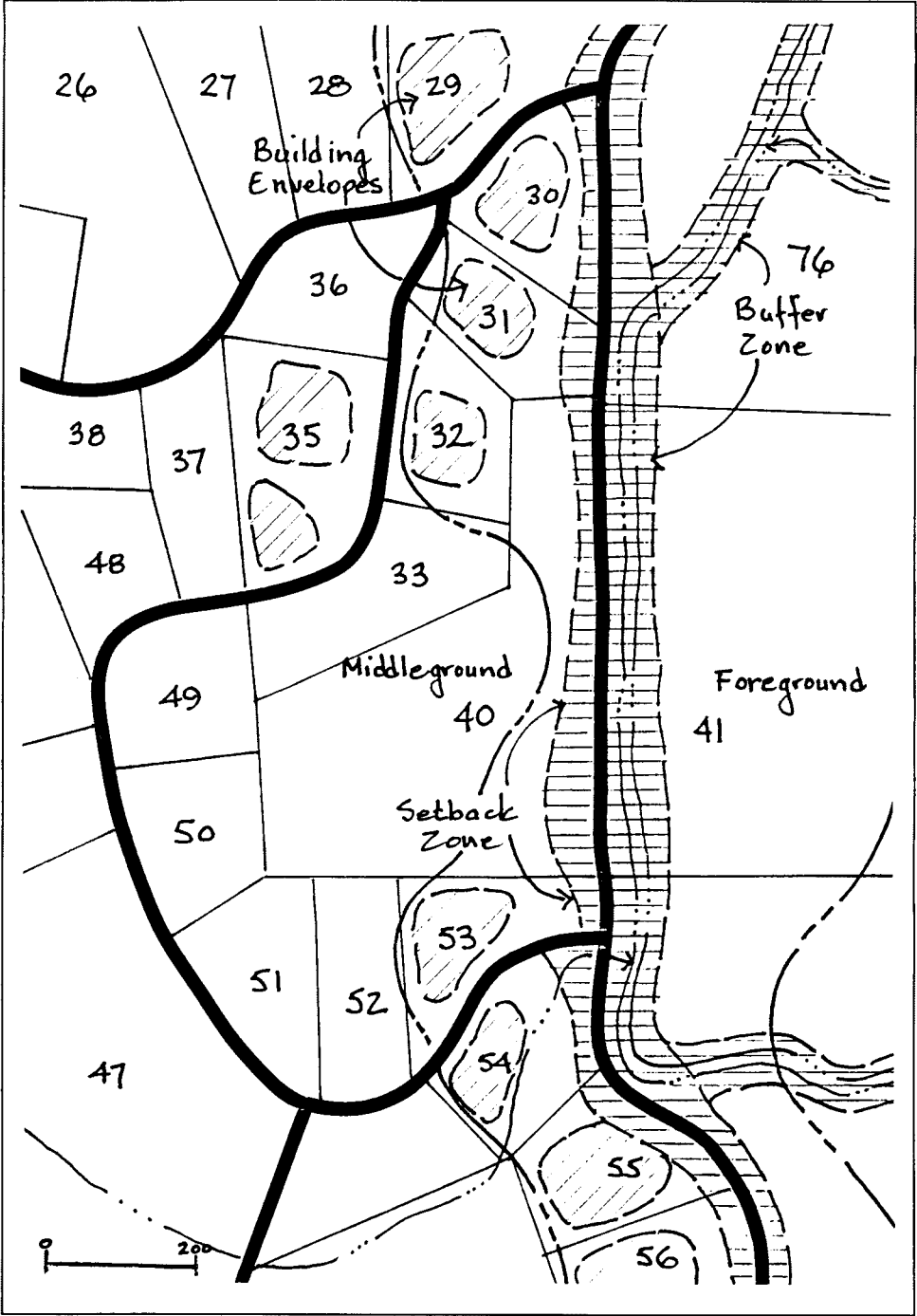


Figure 2. Scenic Corridor Plan.

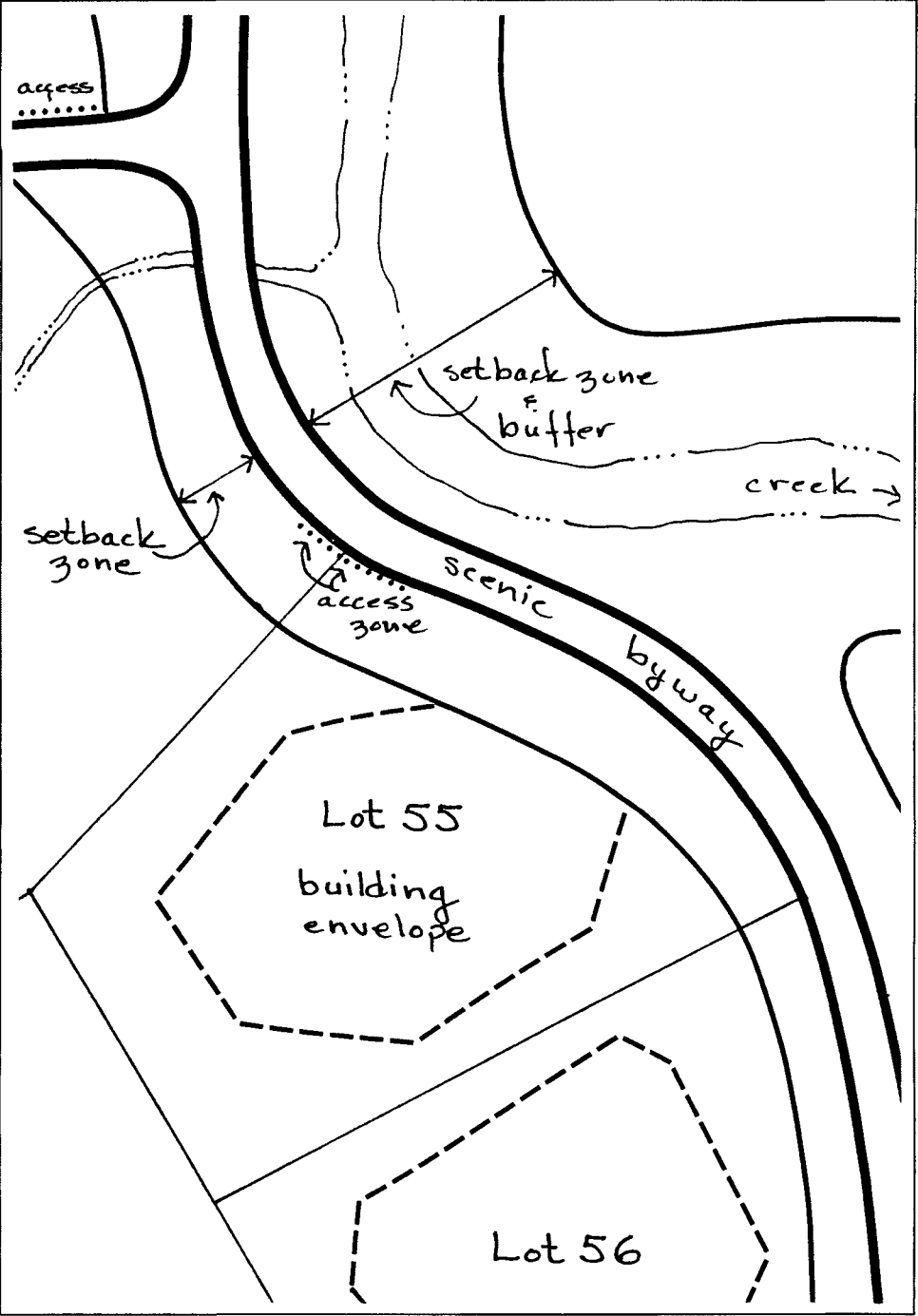


Figure 3. Detail of Scenic Corridor Plan.

demonstrate that they promote the public health, safety, and general welfare.

The following list outlines the general content of a site plan review ordinance that would be applicable to the land use corridor along the scenic byway:

- Purpose of the site plan review ordinance.
- Projects requiring site plan review.
- Procedure.
- Submission requirements.
- Criteria for review.
- Standards requiring findings.
- Enforcement.
- Appeal process.
- Other sections as needed.

SUMMARY OF THE SCENIC BYWAY PLANNING PROCESS

The protection and management of the visible corridor is an essential component of the scenic byway plan. Without proper protection and management, corridors tend to deteriorate in visual and aesthetic quality. This deterioration has been the case in many situations where growth and change in land use have taken place in rural areas over a relatively short time (Doherty, 1984). However, interest in rural conservation, especially the protection of rural values, quality of life and scenery, appears to be building (Strokes, *et al.*, 1988). Yet at the same time individual and community concern for economic growth and employment is strong. A central issue is whether conservation and development can coexist in these rural regions.

Roads play an important role in both rural growth and rural conservation. How to reconcile disparate opinions and view of rural residents, landowners, and community leaders is an issue of great concern in many courthouses and council chambers. We see

the scenic byway program as a bridge between the protection of aesthetic and environmental quality and the facilitation of economic growth and land resource development. Scenic byways can be protected and managed through growth and changes in land use. We believe that corridors can be planned, designed, and managed to enhance visual and aesthetic quality through controlled physical growth rather than simply accepting the deterioration of the landscape. To achieve this goal, however, requires the work and support of interested and concerned individuals, groups, and communities.

Our approach is to foster community support for scenic byways through traditional land planning procedures. This approach calls for the articulation of goals and objectives of local communities in order to reach consensus on the policies and plan necessary to create a scenic corridor and protect the aesthetic quality of the landscape. We have found that many communities can agree on the value of conserving their rural heritage. The strongest issue appears to be how to accommodate new development or changes in land use. Protection of aesthetic and environmental quality need not be in conflict with new structures, improvements, or activities. Forethought and attention to the site planning and design of these potential changes can create harmonious arrangements that are visually compatible within the existing landscapes. To accomplish this outcome, however, requires scenic byway and visual corridor policies and plans. These policies and physical plans can then be realized through appropriate implementation of good planning and design tools.

We have found that performance standards can meet the need for reasonable yet strong control in most environmental situations. For example, in situations where control of stormwater runoff, soil erosion, sedimentation, water quality, and wastewater discharge are important, performance

standards can be developed to monitor and control land use activity. Performance controls can also be developed for visual or aesthetic considerations, such as visual screening, landscape restoration, or vegetation management.

Design guidelines can provide illustrations and examples of design ideas and solutions in typical situations. Guidelines are important to use as a reference for landowners, civic leaders, and local public officials. They should not, however, take the place of creative or innovative design solutions.

The scenic corridor plan contains the spatial elements of overall corridor design. It embodies specific approaches to concept plans and policies on a site-by-site basis. As such, it provides the spatial structure for the individual parcels that make up the visual corridor. The scenic corridor plan may be flexible to allow for innovation in certain situations. In others, it must be firm if it is to achieve the goals and objectives of the corridor plan. It is the spatial blueprint for constructing and managing a scenic corridor.

METHODS OF SCENIC INVENTORY AND ANALYSIS

Methods of visual analysis of the road and route corridor have been developed by a number of workers in the planning and design fields over the past 25 years (Levin, 1965). Much of this work has been directed towards high-speed highways in urban settings (Appleyard, *et al.*, 1964), freeways (Halprin, 1966), or western interstate highways (Litton, 1968). Less attention has been directed towards small-scale, low-speed country roads, which serve rural populations and regions. Many of these routes traverse landscapes of great character and beauty. These roads have often evolved from earlier wagon routes which served small farms and settlements and still provide a leisurely and intimate

connection with the landscape in which they pass. Methods of visual inventory and scenic analysis developed for urban freeways or high-speed interstates are not refined enough for low-speed, narrow country roads (Hornbeck and Okerlund, 1973).

Faculty and students in the Landscape Architecture Program have undertaken extensive study of methods of scenic inventory and analysis in the process of developing strategies to enhance and manage the visual corridor along these roads. A number of these methods, described below, are useful for analysis of existing road conditions.

VISIBILITY DIAGRAMS AND COMPOSITE MAPS

Visibility diagrams and resultant composite maps of visibility provide a simple graphic inventory of the visual corridor from a number of observation points along a road segment. The purpose of such diagrams is to record all areas that are visible, within the entire scenic corridor, from the byway. These areas typically account for only one-fifth to one-third of the total scenic corridor (U.S. Forest Service, 1977). It is this visual mosaic that must be protected, enhanced, and managed to provide the visual backdrop for the scenic road experience.

While procedures for the selection of viewing points may vary, the construction of visibility diagrams is relatively simple. Each diagram records only those portions of the landscape that are visible in one road direction from a single viewing point, as illustrated in Figure 4. Potential rather than existing visibility is often recorded as changes can occur, especially along the roadway, that may increase visibility. As Figure 4 shows, the total area visible from a single point is usually relatively small and composed of many visual pieces which are noncontiguous.

Care should be taken to record only visible features and areas within a reasonable cone of vision since these diagrams will be compiled into composite maps for the entire road segment, as illustrated by Figure 5. Areas visible from a number of different road segments should be especially noted, as their importance may increase with frequency of exposure. Often, background features can be seen from many different locations, and their visual presence in the landscape is important. These are often the landmarks that help us orient and find our way. Visibility diagrams and the resultant composite map are constructed for viewsheds in a single direction of travel; they are not constructed for viewsheds in both directions.

Scenic corridor diagrams can be constructed from composite maps by including all visible areas within the scenic corridor boundary, as shown in Figure 6. Areas that are not visible but lie within the scenic corridor may be viewed as inlier areas which require minimal site review as changes in land use should not influence scenic quality within the corridor. In many landscapes, the total area not visible may be far greater than areas that are visible.

SCENIC ZONES

The scenic corridor may be divided into three distance zones: foreground, middle-ground, and background. This division is helpful in sorting out the various visible areas for purposes of analysis and evaluation of views (Litton, 1968). This division is also used in designating design guidelines for siting structures and improvements. The measurement of distance within or between zones is somewhat arbitrary, depending upon the scale of the landscape and roadway. Zones in large-scale landscapes viewed from interstate highways are often measured in miles, while zones in small-scale landscapes viewed from narrow rural roads tend to be

measured in hundreds of feet.

The foreground is generally the area adjacent to the roadway and readily experienced by the traveler. It provides the frame of reference, detail, and sense of scale for all views. Along narrow country roads the foreground is in intimate connection with the motorist and is of prime concern for the framing or screening of views.

Middleground, the intermediate landscape, often provides the linkage between units or elements in the landscape. Features or scenes in this zone characterize the overall landscape. Middleground views tend to be important to the visual experience of the scenic corridor.

The background provides the backdrop or matrix for views from the roadway. It is often a minor component of the total view, especially in ridge and valley regions. However, in large-scale panoramic views the background assumes greater importance as landscape matrix. The general background views tend to be simplified, flattened, and "grayed down" or softened in color contrasts.

VIEW ZONE DIAGRAMS

View zone diagrams provide an inventory of the relative proportion of foreground, middleground, and background views along both sides of road segments. Views of the sky and the roadway may also be included in the diagram for inventory and analysis, as illustrated in Figure 7. These diagrams allow analysis of the continuity or discontinuity of view zones, sequence and pattern of zone representation, and the proportional content of each zone. View zone diagrams provide quantitative or structural analysis of any view. They indicate when view zone proportions are "balanced." For example, views at station 5 in Figure 7 lack middleground and background context and are focused on the road and foreground experience in both directions, while views



Figure 4. Visibility Diagram.



Figure 5. Composite Map of Visibility.

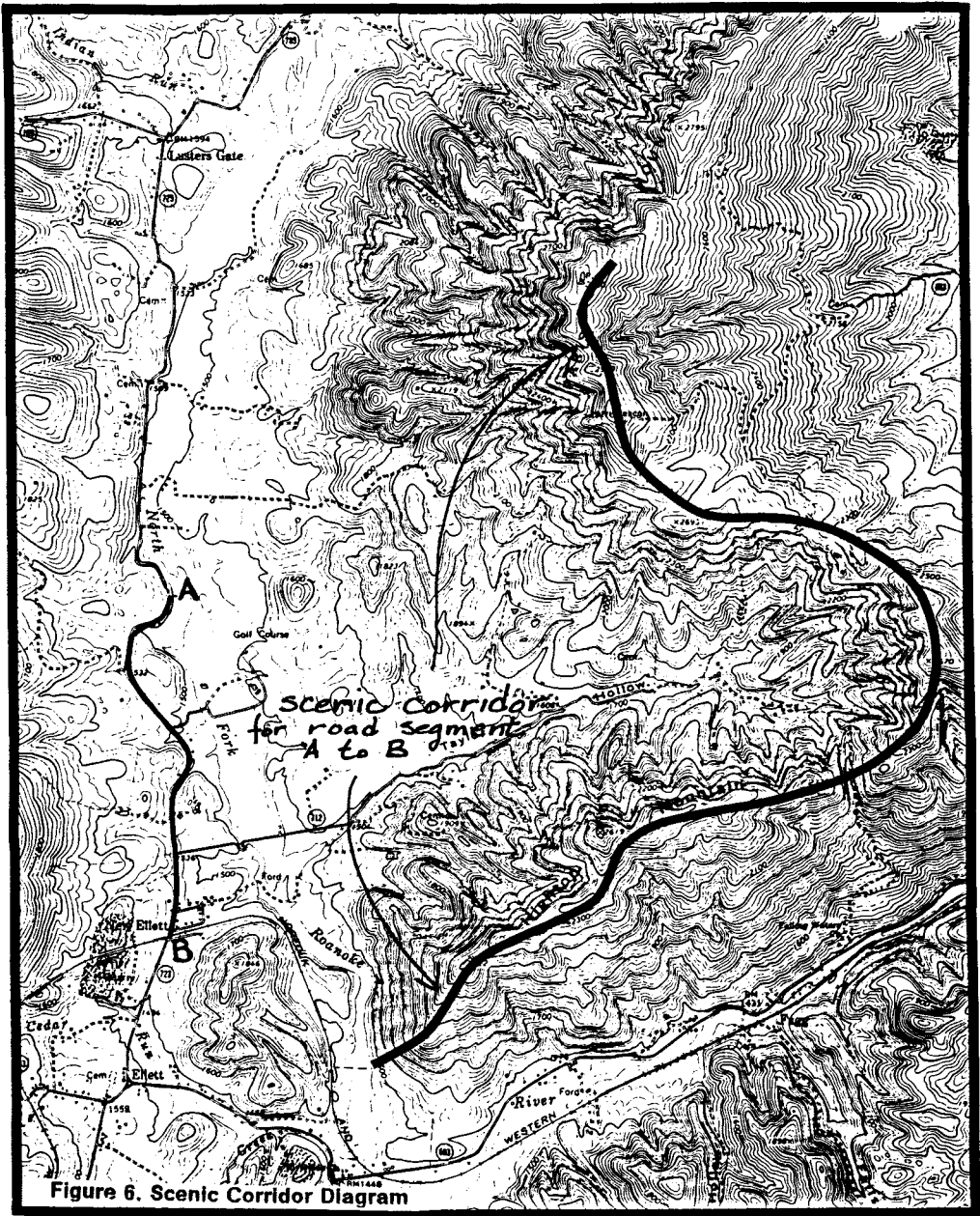


Figure 6. Scenic Corridor Diagram.

between stations 3 and 4 are more balanced.

View zone diagrams provide a quantitative analysis of the various scenic zones. Analysis of zone sequence and pattern of zone visibility is facilitated directly through the use of view zone diagrams. This analysis is most helpful in assessing the need to open up (or close down) views and vistas, especially in the foreground.

GRAPHIC FOREGROUND ANALYSIS

Graphic methods of foreground analysis provide a notation system for a number of features or components on and adjacent to the roadway (Robinson, 1988). These components directly influence corridor visibility, foreground complexity, viewer position, and the sequence of experience. The components, which may be inventories, include road alignments (horizontal and vertical), viewer position, roadside vegetation type, directed sightlines, view characteristics, and miscellaneous features, as illustrated in Figure 8. Symbols have been developed for each component to categorize the range of visual experience occurring along roadways. The purpose of such analysis is to document foreground conditions for detailed design or management of the roadway, for the adjacent right-of-way, and for foreground areas. The example shown in Figure 8 indicates a road segment which places the viewer in a superior position in the immediate landscape. The roadway is gently curving downward and to the left,

adjacent to a fence line and power poles, both of which frame an open foreground and middleground. The right side of the roadway serves as a visual barrier or edge in the landscape focusing the viewer's attention along the road.

SUMMARY OF INVENTORY AND ANALYSIS METHOD

The protection and management of the visible corridor along scenic byways is essential for the continued enjoyment of the scenic resource. Methods of visibility description and visual analysis can provide data on the visual and aesthetic character of a scenic corridor. They also provide information helpful in the recognition and understanding of the spatial pattern, sequence, and complexity of landscape corridors. Such information is important in the planning, design, and management of existing byway corridors. While several of these methods have been in use for a number of years, others have been developed to meet the need for corridor analysis and for evaluation of rural country roads. Continued research and applied study of rural scenic byways will, it is hoped, provide additional methods of inventory and analysis.

The methods described above provide a set of tools to aid in corridor planning and design. These tools, if systematically applied, can provide both valuable information and a strong design framework for the planner and designer of rural scenic byways.

ACKNOWLEDGMENTS

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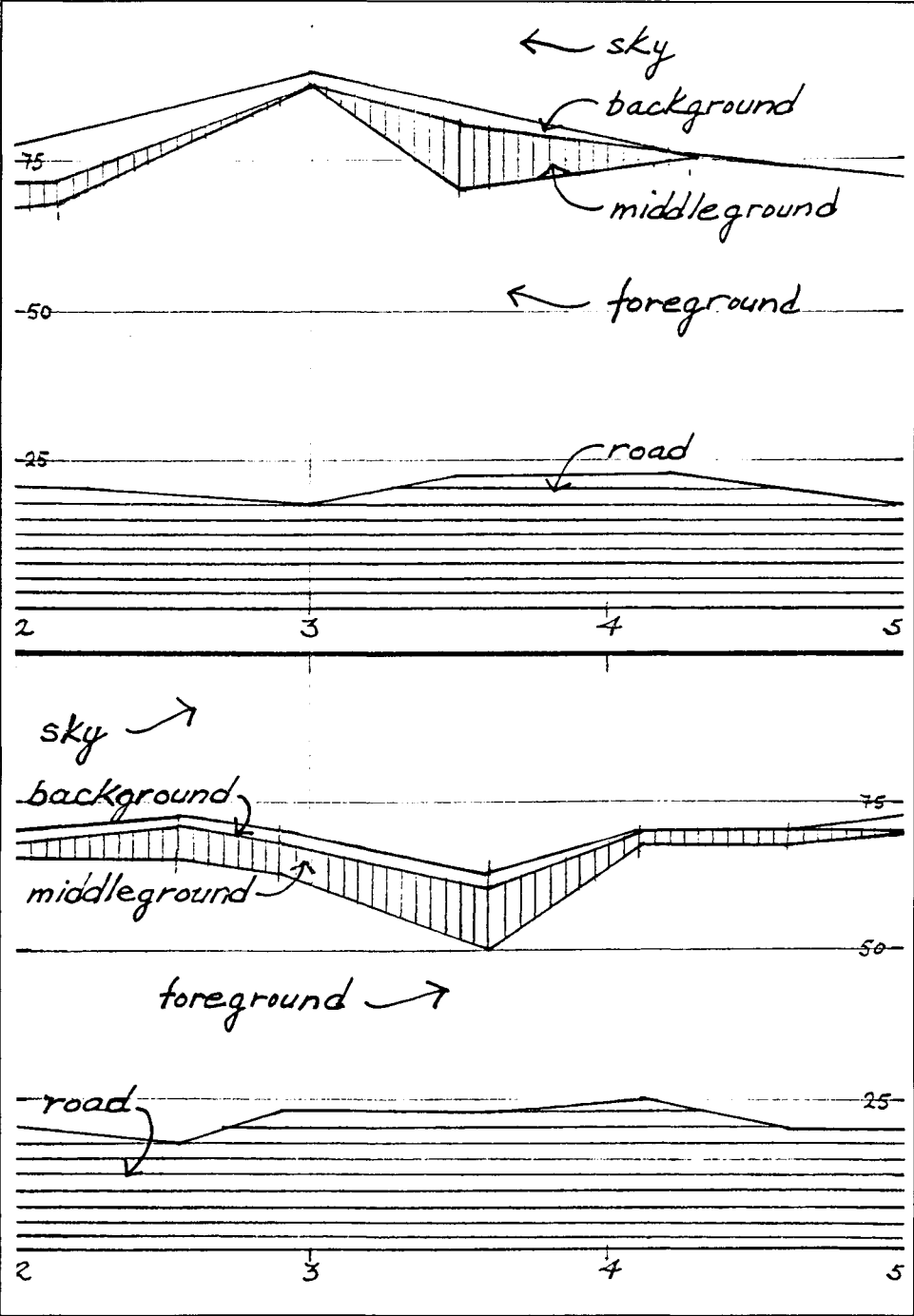


Figure 7. View Zone Diagram.

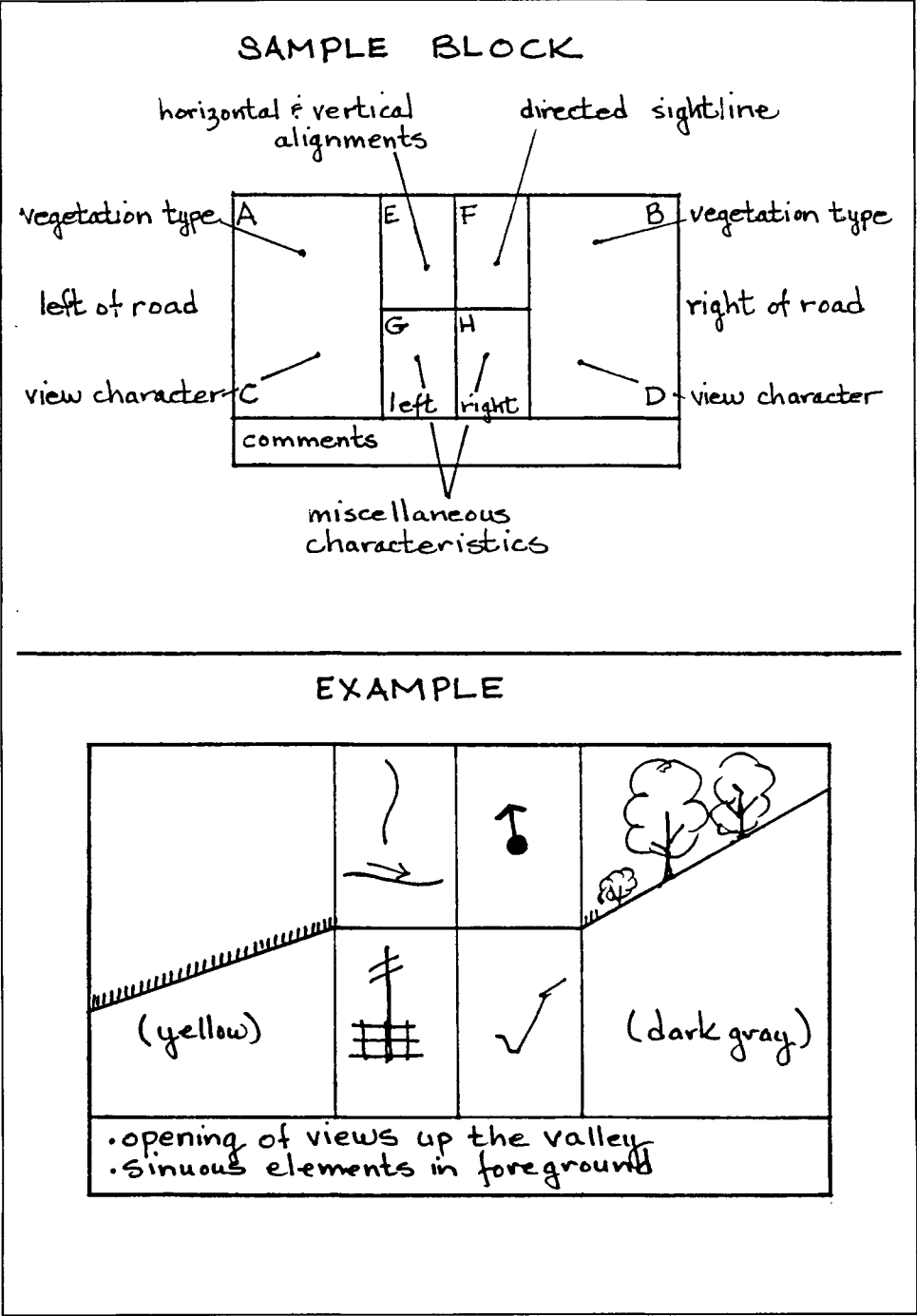


Figure 8. Graphic Foreground Analysis.

REFERENCES

- Appleyard, D., K. Lynch, and J. Meyer. *The View from the Road*. M.I.T. Press. Cambridge, Massachusetts, 1964.
- Blake, P. *God's Own Junkyard: The Planned Deterioration of America's Landscape*. Holt, Rinehart, Winston. New York, New York.
- Doherty, J. *Growth Management in Cities. Volume 1: Change and Response*. Vert Milon Press. Alexandria, Virginia, 1984.
- Duersken, C. *Aesthetics and Land-Use Controls: Beyond Ecology and Economics*. American Planning Association Planning Advisory Service Report No. 399. Chicago, Illinois, 1986.
- Halprin, L. *Freeways*. Reinhold, New York, New York, 1966.
- Hornbeck, P., and G. Okerlund. *Visual Values for the Highway User: An Engineer's Workbook*. U.S.D.O.T., Federal Highway Administration. Washington, D.C., 1973.
- Levin, D. *A Proposed Program for Scenic Roads and Parkways*. President's Council on Recreation and Natural Beauty. Washington, D.C., 1966.
- Levin, D. *Scenic Byways*. U.S.D.O.T. Federal Highway Administration Publication No. FHWA-DF-88-004. Washington, D.C., 1988.
- Litton, R. *Forest Landscape Description and Inventories: A Basis for Land Planning and Design*. U.S.D.A. Forest Service Research Paper PSW-49. Berkeley, California, 1968.
- Robinson, S. "Method of Foreground Analysis." A paper submitted to the Graduate Landscape Planning and Management Studio in the Landscape Architecture Program, Virginia Polytechnic Institute and State University. Blacksburg, Virginia, 1988.
- Stokes, S., A. Watson, G. Keller, and J. Keller. *Saving America's Countryside: A Guide to Rural Conservation*. John Hopkins University Press. Baltimore, Maryland, 1988.
- U.S. Forest Service. "Roads" *National Forest Landscape Management. Volume 2*. Chapter 4. U.S. Government Printing Office. Washington, D.C., 1977.

Exciting Liaisons: Cross-Fertilization Among the Disciplines Leads to New Solutions for Greenways

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Finally, I took a walk alone to the levee. I wanted to sit on the muddy bank and dig the Mississippi River; instead of that I had to look at it with my nose against a wire fence. When you start separating the people from their rivers, what have you got? Bureaucracy!

Jack Kerouac, *On The Road*, 1955

Kerouac's frustration at being shut out from the river typifies the opening salvo in what was to be a protracted battle of nearly two decades between the pragmatics and the romantics over how to handle our nation's waterways.

One side was typified by the engineers. Their charge was to serve the public need to be safe from the river's ravages; to make land available for development; to harness the river for shipping goods and generating power. Their employers demanded cost-effective solutions and a minimum of liability exposure. The solutions they designed usually met those needs (at least temporarily) but not without great cost to the "soul" of the river or stream. Later, we were to learn that the cost was much more than aesthetic as rivers rebelled and many structural solutions ultimately failed.

On the other side of this struggle sat the romantics. This group included, among others, citizen activists, landscape architects, and planners. They argued for preservation, recreation, and beautification but seemed unwilling or unable to address the realities of cost and the fact that people already settled along the rivers and streams and demanded protection from the perils.

In the early 1970s, this standoff began to soften with the emergence of the greenway

movement. Several communities around the nation were beginning to see new possibilities when they looked at their rivers and streams. Urban greenways became an excellent place to begin the process of mediation. Now, new partnerships have emerged between engineering and landscape design professions.

Getting its start in 1971, Denver's Platte River Greenway project addressed the Platte River and its tributaries. The Denver Greenway represents one of the nation's pioneering efforts in bringing the disciplines together. Let us explore this process with several specific examples.

LITTLETON'S PLAN—A NON-STRUCTURAL ALTERNATIVE

After a disastrous flood in 1965, the U.S. Army Corps of Engineers decided to proceed with construction of Chatfield Dam. The dam was to be located upstream of metropolitan Denver where the Platte leaves the mountains and enters the high plains. The plan included an "improved" structural channel extending six-and-one-half miles downstream from the dam. This plan did not go unnoticed by Littleton, a suburban community located not far downstream of the dam. Fearing that their beautiful high plains river valley would be ruined by a Los Angeles-style concrete channel, they expressed their concerns to the Corps and the Corps offered a predominantly earthen channel.

Littleton, however, held its ground and put forth an alternative, later to become known as the Littleton Plan (see Payne, 1989). The plan was simple but revolutionary. The Corps was asked to abandon the notion of construction and to commit the funds



Figure 1. A view where the Greenway Trail enters South Platte Park, a 600-acre riparian wilderness on the edge of the Denver metro area.

budgeted for structural work to the acquisition of the undeveloped portions of the floodplain. Littleton even sweetened its proposal with a \$400,000 bond issue to help with land acquisition.

The Corps wanted no part of this alternative. Citing the Flood Control Act of 1950, Corps officials from the Omaha office said the Littleton proposal was not feasible. Littleton, undaunted, went to Washington and pushed for passage of the Water Resources Development Act (Public Law 93-251). Section 88 of the act authorized federal participation with local interests for acquisition of land for flood-control purposes in lieu of structural improvements. With passage of the new act, the Corps provided funding equal to the costs saved by not building the structural improvements, or \$756,000, with any costs beyond that

reimbursed at 50%. Today, a 625-acre high plains riparian preserve, known as South Platte Park, fronts the South Platte River in Littleton. Now the Corps and greenway proponents are working as partners in improving the river downstream of South Platte Park.

PUBLIC ACCESS—A MAINTENANCE ROAD AND MORE

One of the key elements that made Denver's greenway system a success is the continuous system of interconnected trails along the Platte River as well as its tributary streams and canals. This multi-use trail concept got its start on Denver's Highline Canal, an irrigation and water-supply canal owned by the Denver Water Board. For years, maintenance crews used dirt "ditch rider" roads for

access to the canal for routine and remedial maintenance. Through a cooperative agreement between the Denver Water Board and the Denver Parks Department, a paved hike/bike/equestrian trail was developed along the canal. The new trail linked many residential neighborhoods on the city's east side and was an immediate hit. Fears of lawsuits by injured users and declining property values from vandals attacking adjacent properties did not materialize. Instead, some of Denver's most valuable homes now front the canal trail.

Inspired by the Highline Canal success, the people of Denver clamored for a similar amenity along the South Platte River. This task proved far more difficult because the river flowed through some of Denver's least desirable areas. The river had been a dumping ground for years; the surrounding neighborhoods were blighted; and the banks were

riddled with broken concrete, trash, and debris.

A unique coalition formed to address this challenge. The effort was initiated in 1974 by Denver's then-mayor Bill McNichols. Joined by Joe Shoemaker, a powerful state legislator, a public-private partnership was created. The group raised funds from local, state, federal, and corporate sources to transform the river. Concrete rubble and eroding banks were replaced by stable, yet attractive, sideslopes held with more naturally appearing rock riprap. A continuous warm-tone concrete hike/bike/equestrian/maintenance trail was constructed, linking parks and feature areas along the cleaned-up river.

A few years later, Mary Carter, an energetic volunteer, led a group in the southern suburbs to extend the greenway from Denver through Littleton and South

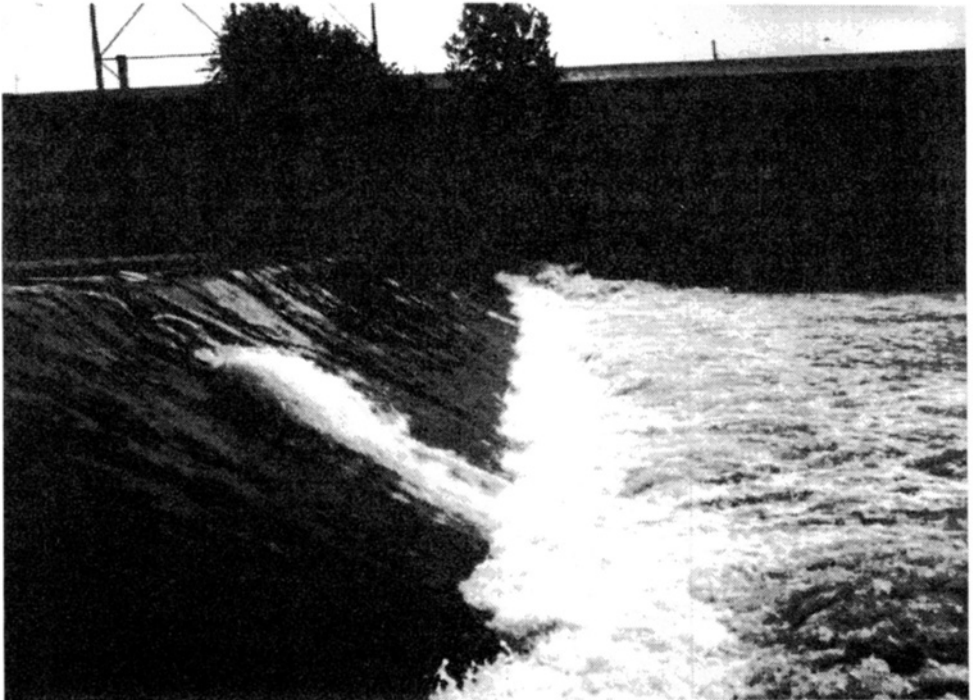


Figure 2. Typical "killer" dam on South Platte River before modification.

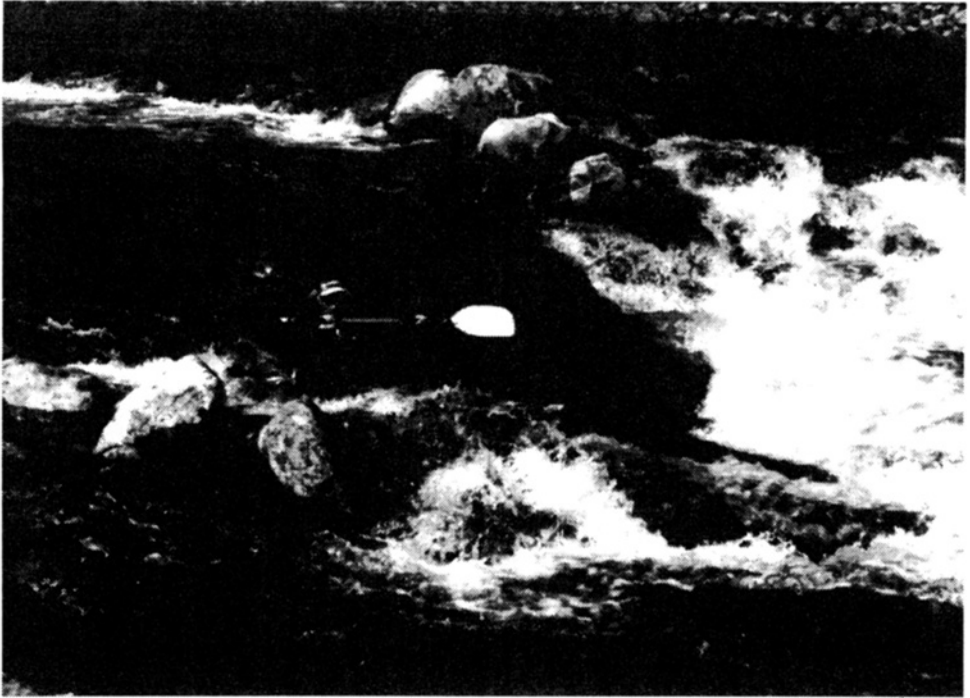


Figure 3. Dam on South Platte River after modification.

Platte Park to the State Recreation Area at Chatfield Dam. The Corps of Engineers was a key player in this process, providing a graded bench for the trail and over \$1.1 million in federal funds, which Carter matched by going to local communities and business for donations.

The Denver Urban Drainage and Flood Control District also proved to be an important participant in the greenway development process. This flood management agency had an inspired staff of drainage engineers who immediately saw the virtue of a joint venture with greenway planners. They use the hike/bike path as a maintenance road for debris removal and for access to perform remedial flood control. In return, they provide a portion of the trail maintenance services as well as clean-up and pruning along the river banks. It's been a great partnership!

TAKING STEPS AGAINST THE DROWNING MACHINES

As the river became a more pleasant place to be, people wanted to ply its waters in kayaks, rafts, canoes, and inner tubes. While any moving water is dangerous, the Platte had an especially dangerous and insidious threat—a series of erosion control and diversion dams. The dams, like many on our nation's rivers, had a uniform edge along the bottom that created a strong, yet not obvious, suction known as a “keeper.” This keeper can trap and drown an unsuspecting water recreationist.

The greenway organization hired two creative engineering firms to address this challenge—Wright Water Engineers and McLaughlin Engineers. Working with the greenway staff, they developed a stair-step system of pools and weirs to eliminate the

deadly keepers while creating challenging yet safer boating chutes. In addition to providing an exciting ride for boaters, the chutes have been used for white water competition. These structures also help aquatic life and shore birds, serving as a fish ladder.

BOULDER CREEK—A KINDER, GENTLER CHANNEL BOTTOM

Inspired by Denver's success, several surrounding communities set out to do the same along their creeks. Boulder planned a similar greenway along Boulder Creek. In the early 1980s, they built the trail and connected several enchanting creek-front parks. They took technology one step further by restoring the creek-bottom fish habitat. Instead of concrete, large rock was placed strategically in the channel to create a system of pools and weirs suitable to building a thriving trout population. As a finishing touch, Boulder added a fish observatory where trail users can stop and observe a pool from *below* the stream bed.

10,000 TREES—TURNING THE GREENWAY GREEN

As nearly two decades of effort on the Denver greenway system draws to a close, most of the trail and boating infrastructure is in place. While Littleton's South Platte Park has preserved acres of riparian forest and grassland, much of the river downstream is barren of trees. In response to this need and as a local step against global warming, Mary Carter and her South Suburban Park Foundation are organizing a massive volunteer tree planting along the banks of the Platte River. The group hopes to transform the Platte River corridor into a green oasis in the heart of the city.

CONCLUSION: WE CAN WORK TOGETHER

The continuing greenway effort in metropolitan Denver has offered a fertile proving ground where several divergent disciplines have come together, shared ideas, and found new solutions. The process required a common sense of purpose, a willingness to look at a different perspective, and, most importantly, patience and understanding. In Denver, it is still working.

REFERENCE

- Payne, Jon K. *The "Littleton Plan," A Non-Structural Concept for Flood Control*. Littleton Planning Department, Littleton, Colorado, 1989.

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Additional Conference Presentations

- Pioneering the Rural Way More Beautiful: The Blue Ridge Parkway. Harley Jolley, Mars Hill, North Carolina.
- Saving the Traditions of the Blue Ridge Parkway. Granville Liles, Asheville, North Carolina.
- The Hudson River Greenway. Barry Didato, Poughkeepsie, New York and James Bleecker, New York, New York.
- The Search for Environmentally Acceptable Corridors for Linear Facilities Such as Roads, Parkways, Power Lines, and Pipelines. Frank Burggraf, Fayetteville, Arkansas.
- Land Acquisition for Conservation Purposes. Carl Fletcher and Lila Fletcher, Johnson City, Tennessee.
- Footprints on Rare Plants: Habitat Protection through an Integrated Strategy of Design, Interpretation, and Restoration. Bart R. Johnson, Athens, Georgia.
- Steps in State and Local Greenway Conservation Planning. J. Glenn Eugster, Philadelphia, Pennsylvania.
- Southern Appalachian Treasures at Risk: Regional Planning for Habitat Continuity. Laura E. Jackson, Durham, North Carolina.
- Improving and Conserving Water Resources in Prince Edward Island, Canada. Lisa C. Huff and Marcia Brown, Durham, North Carolina.
- Greenways in the Adirondack Park. Robert Quinn and Thomas Cobb, Watertown, New York.
- An Appalachian Greenway. Stanley A. Murray, Kingsport, Tennessee.
- The Interstate Highway Program and the Development of National Parkways, 1959-1966. Philip A. Grant, Bronxville, New York.
- Congress and the Establishment of the George Washington Memorial Parkway, 1929-1933. Philip A. Grant, Bronxville, New York.
- Designers' Vision of Metropolitan Life: The Providence Metro-District Parks System Revisited. David E. Riley, New Bedford, Massachusetts and Derrick Bradford, Providence, Rhode Island.
- A Museum of Managed American Countryside: Landscape Management Plan for the Restoration of Stanley Abbott's Vision of the Blue Ridge Parkway. Neil Korostoff, University Park, Pennsylvania.
- The Use and Development of a Wilderness Centre at the Municipal Level. Jan James, Edmonton, Alberta, Canada.
- Beautification Efforts at a Minimalist Parkway, Richmond National Battlefield Park. Peter Baril, Williamsburg, Virginia.
- St. Croix International Waterway: Managing a Shared Heritage. Lee Sochasky.
- Management of Valley Slopes of Owen Sound, Ontario, Canada. Shaheen Ahmad, Brampton, Ontario, Canada.
- The Cahaba River Corridor: A Wilderness River in an Urban Environment. Brian J. Laltaie, Auburn, Alabama.

- Wildcat River: Building Cooperative Land Protection Strategies for Successful River Conservation.** Phil Huffman and Burnham Martin, Boston, Massachusetts.
- A Public Administration Vision and Strategy: Protection, Management, Use, and Development of Outdoor Resources.** Douglas B. Irwin, Sherwood Park, Alberta, Canada.
- Challenges and Opportunities in the Restoration and Protection of Industrialized River Corridors: The Blackstone River Experience.** Russell A. Cohen, Boston, Massachusetts.
- The Columbia River Highway: Recreation to Reuse.** T. Allan Comp, Washington, District of Columbia.
- Roads of Knowledge: Finding the Landscape of the Heart.** Steve Durrant, Seattle, Washington.
- The Evolution of Environmental Consciousness and Modern Linear Open Space Systems.** Bill Flournoy, Raleigh, North Carolina.
- The Park As a Classroom.** Ken Voorhis, Townsend, Tennessee.
- Urban Gardening Without Any Land: The Magic of Community Gardens.** Marleny Franco, Newark, New Jersey and Tom Youngblood-Peterson, Asheville, North Carolina.
- River Corridor Greenways: A Natural.** Kristina Reichenbach, Petersburg, Illinois.
- Community Planning for Riverfront Improvement: The French Broad River Experience.** Karen Cragnolin, Asheville, North Carolina.
- Media Relations in a Linear Park.** Jim Ryan, Asheville, North Carolina.
- Using Highway Litigation Funds for Open Space Preservation.** Gina McAfee, Englewood, California.
- Paddle Across America: Designing a National Water Trail.** Robert A. Hendrickson, Pensacola, Florida.
- National Rivers Program: A Comparison of the U.S. National Wild and Scenic Rivers and the Canadian Heritage Rivers System.** Robert A. Hendrickson and Denis L. Soden, Pensacola, Florida.
- Natural Environment Conservation Measures on Nikko-Utsunomiya Highway.** Tetsuzo Kozawa, Tokyo, Japan.
- The Role of the Professional in the Administration of Parkways, Greenways, and Riverways.** Elizabeth H. Belcher and J. Douglas Wellman, Blacksburg, Virginia.
- Natchez Trace: Pathway to Parkway.** Irene J. Cornwell, Nashville Tennessee; James L. Bainbridge, Tupelo, Mississippi; Calvin Le Hew, Nashville, Tennessee.
- Implementing Olmsted's Vision for Massachusetts' Historic Landscape: A Forest Reservation (1889) and an Urban Park (1895) for the 21st Century.** Anne Hoover Henderson, Boston, Massachusetts.
- The Urban Park of Oporto, Portugal.** Lynn E. Miller, University Park, Pennsylvania and Sidonio C. Pardal, Lisbon, Portugal.
- Landscaping: A National Treasure.** Bob Hope, Asheville, North Carolina.
- Highway Beautification by Using Native Plants.** Edward Ingle, Asheville, North Carolina.

- Greenways for America. Keith G. Hay, Vienna, Virginia.
- Parks for People: Revitalizing Historic Corridors. Kathleen A. Blaha, Tallahassee, Florida.
- Attitudes of Riparian Landowners Toward a State River Conservation System. Wayne E. Williams, Boone, North Carolina.
- The Legal Basis for Public Evaluations of Landscape Aesthetics in River Corridor Research. Richard E. Chenoweth, Madison, Wisconsin.
- EXPLORE and the Roanoke River Parkway: A Model for Environmental Preservation. H.B. Ewert, Roanoke, Virginia.
- Changing Human Values and Meeting the Demand for Parkways, Greenways, and Waterways: A Social Science Perspective. Denis L. Soden, Pensacola, Florida.
- An Urban Parkway System: Philadelphia's East and West River Drives and the Benjamin Franklin Parkway. Michael P. Nairn, Philadelphia, Pennsylvania.
- Phenomenon of Preserves Concentrated in the Ozarks. Robert Flanders and Robert Gilmore, Springfield, Missouri.
- Wild and Scenic River Study Report and Draft: Environmental Impact Statement on 13 Rivers in the Ozark National Forest. Lauren M. Kindred, Russellville, Arkansas.
- Can an Unwanted Future Freeway Find New Life As A Parkway? Patricia B. Willard, Silver Spring, Maryland.
- Protection of Natural Environment Provided by Penal Law in Poland. Katarzyna Moskwa, Poznan, Poland.
- Developing Design Elements for Scenic Byways. Lester A. Hoel and Bradbury Purinton, Charlottesville, Virginia.
- National Forest Service Byways. Bob Ross, Washington, District of Columbia.
- A Comparative Study of Day Hikers at Great Smoky Mountains National Park and Blue Ridge Parkway. Delmar W. Bachert and Wayne E. Williams, Boone, North Carolina.
- Greenways and Growth Management: Concepts and Implementation Strategies for the Development of an Integrated Open Space and Recreation System in a Rapidly Urbanizing Region. Paul M. Rockwood, San Diego, California and Toni Seymour, Philadelphia, Pennsylvania.
- Listening to the People: A Way to the Way More Beautiful. Grant R. Jones and Steve Durrant, Seattle, Washington.
- Computer Aided Design of Bikeways. Boudewijn Bach, Delft, Netherlands.
- Economic Development: The Glue that Binds the Community Agencies Together in Order to Develop the Chain of Lakes. Dan McDonald, Cedar Falls, Iowa.
- Grassroots Protection of River and Trail Corridors: A Discussion from Experience. Chris Brown, Washington, District of Columbia; Barry Beasley, Columbia, South Carolina; Victor Yarnell, Wyomissing, Pennsylvania.
- Greenway User Characteristics and Attitudes: A Study of the McAlpine Greenway. Owen J. Furuseth, Charlotte, North Carolina.

Law in the System of Environmental Protection in Poland: The Present and the Future. Leopold Moskwa, Poznan, Poland.

Pocket Parks and Grassroots Development. Peter Gregutt and Lee Reading, Asheville, North Carolina.

Battle Creek's Linear Park: Its Past, Present, and Future. Eric W. Lyons, Kalamazoo, Michigan.

The Bay Circuit: 120 Miles of Parks, Trails, Waterways, and Scenic Roads in the New England Landscape. Susan Ziegles, Boston, Massachusetts.

A Geographic Analysis of Viewsheds Along Parkways, Greenways, and Riverways: A Universal Model. Arthur Rex, Boone, North Carolina.

Illinois Railbanking. Bob Thornberry, Springfield, Illinois.

The Changing Context of Historic Urban Parks: An Analysis of Adaptive Reuse Techniques and Philosophies. R. Bruce Westbrook, Alexandria, Virginia.